

October 1957

Pages 445-484

# The Journal *of the* Society of Dyers and Colourists

Volume 73



Number 10

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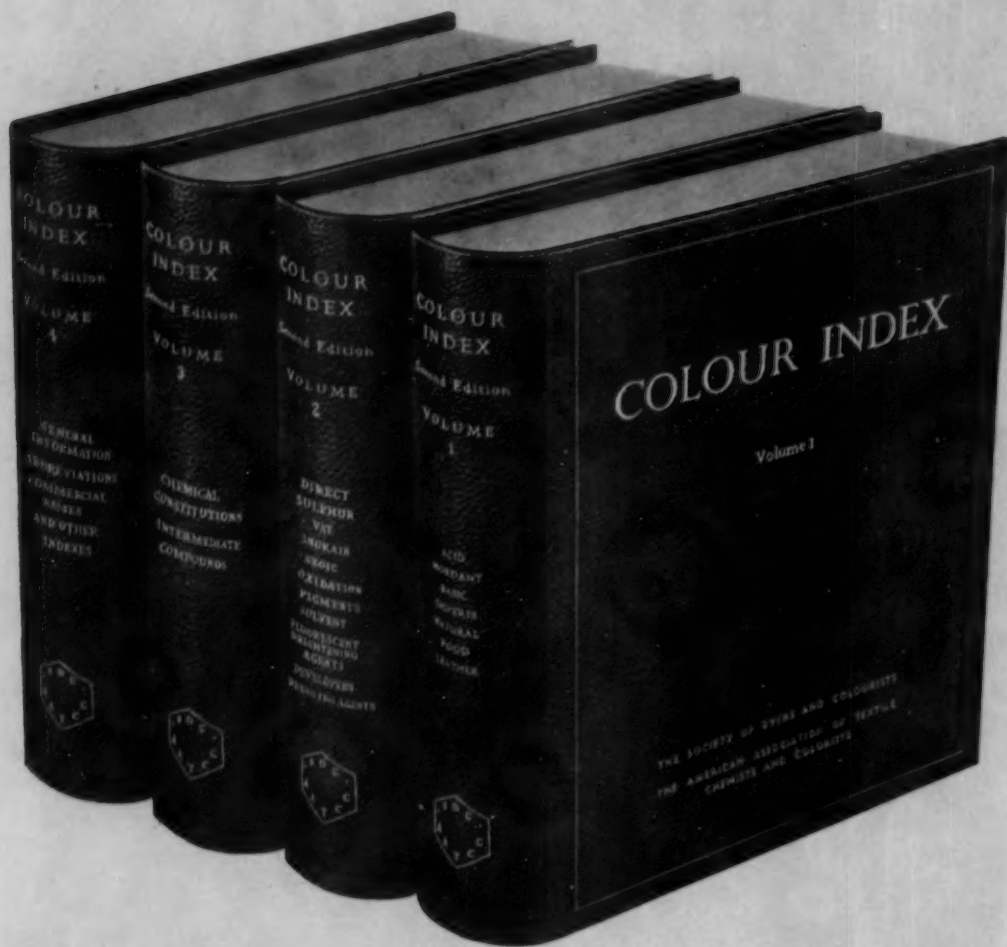
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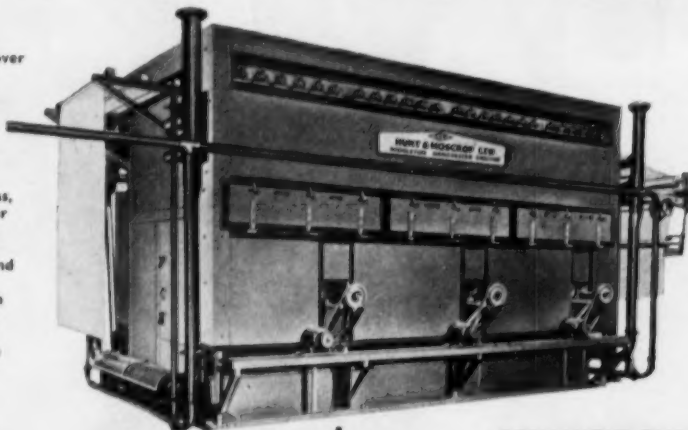
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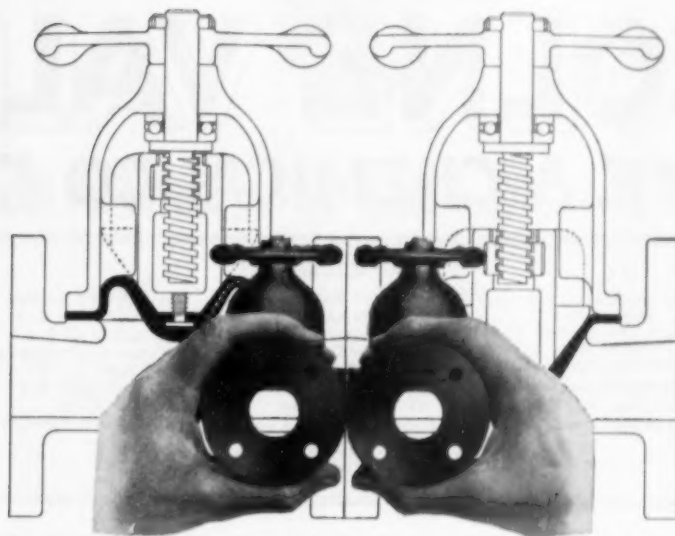
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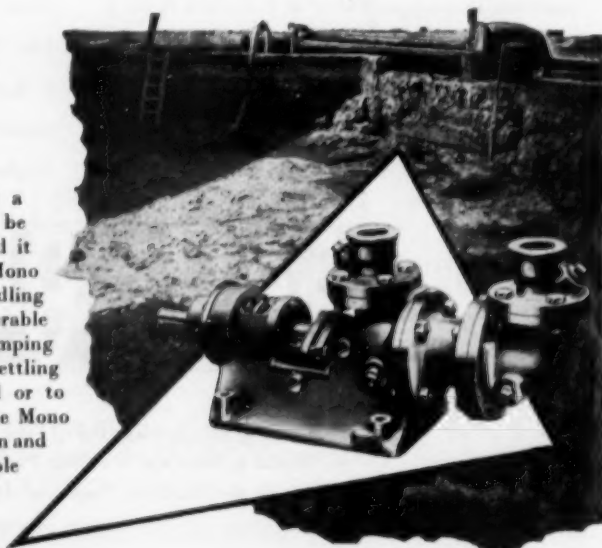
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## NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring general information regarding the Official Notices, List of Officers of the Society, etc. should consult pages 1-7 of the January 1957 and pages 285-290 of the July 1957 issues of the *Journal*, or write to *The General Secretary, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford 1, Yorkshire (Telephone Bradford 25138)*. Editorial Communications should be addressed to *The Editor*, at the same address.

## Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the *Journal*—

### LECTURES

Application of Colour Physics to Textiles

*J. C. Guthrie and P. H. Oliver*

Levelling Problems in Vat Dyeing

*H. Musshoff*

### COMMUNICATIONS

The Preparation and Properties of Regenerated Cellulose containing Vinyl Polymers

III—Moisture Relations

*G. Landells, J. A. Leathley, and C. S. Whewell*

Relative Stabilities of Metal Derivatives of

oo'-Dihydroxyazo Dyes

*F. A. Snively, W. C. Fernelius, and B. E. Douglas*

### EXPLANATORY PAPER ON MODERN THEORY

The Interaction of Fibrous Synthetic Polar Polymers and Liquids

*W. R. Moore*

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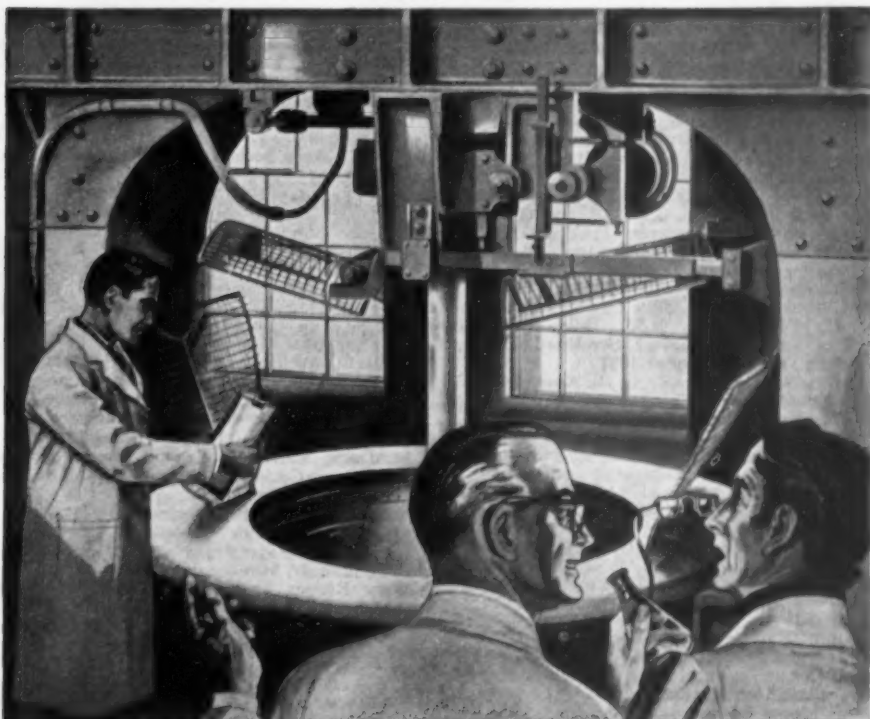
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## FORTHCOMING MEETINGS OF THE SOCIETY

### Wednesday, 30th October 1957

MIDLANDS SECTION. *New Developments in the Winch Dyeing of Cotton Knitted Fabrics.* C. Newton, Esq., A.M.C.T. King's Head Hotel, Loughborough. 7 p.m.

### Thursday, 31st October 1957

WEST RIDING SECTION. *The Dyeing of Acrilan and its Blends.* H. R. Hadfield, Esq., M.Sc.Tech. (Imperial Chemical Industries Ltd.). Victoria Hotel, Bradford. 7.30 p.m.

### Friday, 1st November 1957

LONDON SECTION. *Problems of Early English Calico Printing.* Peter Floud, Esq., C.B.E., Keeper of Circulation, Victoria and Albert Museum. (Joint meeting with the London Section of the Textile Institute.) Royal Society, Burlington House, London, W.1. 6 p.m.

### Wednesday, 6th November 1957

BRADFORD JUNIOR BRANCH. *Fast Shades on Polyamide Fibres.* C. Hobday, Esq., B.Sc. (Geigy Co. Ltd.). Bradford Institute of Technology, Bradford. 7.15 p.m.

### Tuesday, 12th November 1957

SCOTTISH SECTION. *New Methods for the Assessment of the Dyeing Characteristics of Neutral-dyeing Wool Dyes.* Dr. H. R. Hirsbrunner (J. R. Geigy S.A., Basle). St. Enoch Hotel, Glasgow. 7.15 p.m.

This paper will contain many interesting data on the dyeing characteristics of the metal-complex dyes compared with those of the Polar type, and in addition will present a new interpretation of the exhaustion properties of these dyes under varying conditions.

NORTHERN IRELAND SECTION. *The Dyeing and Finishing of Fibro Blends.* W. Lonie, Esq., B.Sc., Ph.D. (British Rayon Research Association). Thompson's Restaurant, Donegall Place, Belfast. 7.30 p.m.

### Wednesday, 13th November 1957

SCOTTISH JUNIOR BRANCH. *Synthetic Detergents in the Textile Industry.* H. Carter, Esq., A.R.I.C. (Shell Chemicals Ltd.). Technical College, Paisley. 7.30 p.m.

### Thursday, 14th November 1957

MANCHESTER JUNIOR BRANCH. *Bleaching—Its History and Fundamental Principles.* (The Bleachers Association.) Colin Garrett, Esq., F.T.I. Room C9, Manchester College of Technology, Manchester. 4.30 p.m.

WEST RIDING SECTION. *New Methods for the Assessment of the Dyeing Characteristics of Neutral Dyeing Wool Dyes.* Dr. H. R. Hirsbrunner (J. R. Geigy S.A., Basle). Victoria Hotel, Bradford. 7.30 p.m.

### Friday, 15th November 1957

HUDDERSFIELD SECTION. Annual Dinner.  
MANCHESTER SECTION. Ladies' Evening. Manchester College of Science and Technology, Manchester. 7 p.m. Details to be announced later.

### Tuesday, 19th November 1957

HUDDERSFIELD SECTION. *New Methods for the Assessment of the Dyeing Characteristics of Neutral Dyeing Wool Dyes.* Dr. H. R. Hirsbrunner (J. R. Geigy S.A., Basle, Switzerland). Silvios Cafe, Westgate, Huddersfield. 7.30 p.m.

MIDLANDS SECTION. *Flameproofing.* T. H. Morton, Esq., M.Sc., Ph.D., F.S.D.C. and F. Ward, Esq. Gas Board Theatre, Nottingham. 7 p.m.

SCOTTISH SECTION. Sectional Dance. Oxford Suite of Burlington House, Bath Street, Glasgow. 7.30 p.m. to 12 midnight.

### Thursday, 21st November 1957

BRADFORD JUNIOR BRANCH. *Dyeing Machinery.* K. Lambert, Esq. (Longclose Engineering Co. Ltd.). Bradford Institute of Technology, Bradford. 7.15 p.m.

### Tuesday, 26th November 1957

NORTHERN IRELAND SECTION. *Terylene Polyester Fibre in the Linen Industry.* P. W. Eggleston, Esq., B.Sc., A.T.I. (Imperial Chemical Industries Ltd.). (Joint Meeting with the Textile Institute.) Kensington Hotel, Belfast. 7.30 p.m.

### Thursday, 28th November 1957

WEST RIDING SECTION. *Problems in the Dyeing of Fast to Washing Colours on Wool Yarn.* J. F. Gaunt, Esq., Ph.D., F.R.I.C., F.T.I. (Patons & Baldwins Ltd.). Metropole Hotel, King Street, Leeds. 7.30 p.m.

### Tuesday, 3rd December 1957

SCOTTISH JUNIOR BRANCH. *The Measurement of Damage to Wool Fibres.* J. C. Brown, Esq. (Clayton Dyestuffs Co. Ltd.). Technical College, Paisley. 7.30 p.m.

### Friday, 6th December 1957

BRADFORD JUNIOR BRANCH. *Dyeing and Finishing of Fibro Blends.* W. Lonie, Esq., B.Sc., Ph.D. (British Rayon Research Association). Bradford Institute of Technology, Bradford. 7.15 p.m.

LONDON SECTION. *Colour in Writing and Copying.* J. P. Gill, Esq., B.Sc. (Imperial Chemical Industries Ltd.). Royal Society, Burlington House, London W.1. 6 p.m.

### Tuesday, 10th December 1957

NORTHERN IRELAND SECTION. *An Impartial Observer's View of the Bleaching and Dyeing Industry—A Consultant Speaks Out.* T. L. Collyer, Esq., C.B.E., A.M.I.Mech.E., A.M.I.I.A. Thompson's Restaurant, Donegall Place, Belfast. 7.30 p.m.

SCOTTISH SECTION. *Dyeing of Acrilan.* H. R. Hadfield, Esq., M.Sc.Tech. (Imperial Chemical Industries Ltd.). St. Enoch Hotel, Glasgow. 7.15 p.m.

Recent developments in the dyeing of Acrilan will be reviewed and the dyeing and fastness properties of acid, chrome and disperse dyes will be detailed. The dyeing of Acrilan blends will be briefly reviewed.

### Wednesday, 11th December 1957

MIDLANDS SECTION. *The Application of Amino Resin Finishes to Cotton.* A. R. Smith, Esq., B.Sc. King's Head Hotel, Loughborough. 7 p.m.

### Thursday, 12th December 1957

MANCHESTER JUNIOR BRANCH. *The Textile Finisher.* F. Wood, Esq. Room C9, Manchester College of Technology, Manchester. 4.30 p.m.

WEST RIDING SECTION. *Watering of Acetate Poults.* E. France, Esq., B.Sc., A.R.C.S., A.M.C.T. (Courtaulds Ltd., Bocking). Victoria Hotel, Bradford. 7.30 p.m.

### Tuesday, 17th December 1957

HUDDERSFIELD SECTION. *The Dyeing of Blends of Fibro with other Man-made Fibres and with Cotton.* W. Lonie, Esq., B.Sc., Ph.D. and R. A. Rutherford, Esq., B.Sc. (British Rayon Research Association). Silvios Cafe, Westgate, Huddersfield. 7.30 p.m.

### Friday, 10th January 1958

LONDON SECTION. *Colour for the Dyer.* Professor W. D. Wright (Imperial College of Science and Technology). (Joint meeting with the London Section of the Oil and Colour Chemists' Association.) Royal Society, Burlington House, London, W.1. 6 p.m.

### Tuesday, 14th January 1958

NORTHERN IRELAND SECTION. *The Chemical Foundations of Fast Colour Printing.* A. S. Fern, Esq., B.Sc., D.I.C., F.S.D.C. (Imperial Chemical Industries Ltd.). Further details later.

### Thursday, 16th January 1958

MANCHESTER JUNIOR BRANCH. *High Temperature Dyeing on Synthetic Fibres.* H. R. Hadfield, Esq., M.Sc.Tech. Room C9, Manchester College of Technology, Manchester. 4.30 p.m.

WEST RIDING SECTION. *Continuous Dyeing of Wool.* D. R. Lemin, Esq., B.Sc. (Imperial Chemical Industries Ltd.). Victoria Hotel, Bradford. 7.30 p.m.

### Friday, 17th January 1958

MANCHESTER SECTION. *The Chemical Foundations of Fast Colour Printing.* A. S. Fern, Esq., B.Sc., D.I.C., F.S.D.C. (Imperial Chemical Industries Ltd., Dyestuffs Division). The Textile Institute, 10 Blackfriars Street, Manchester 3. 7 p.m.

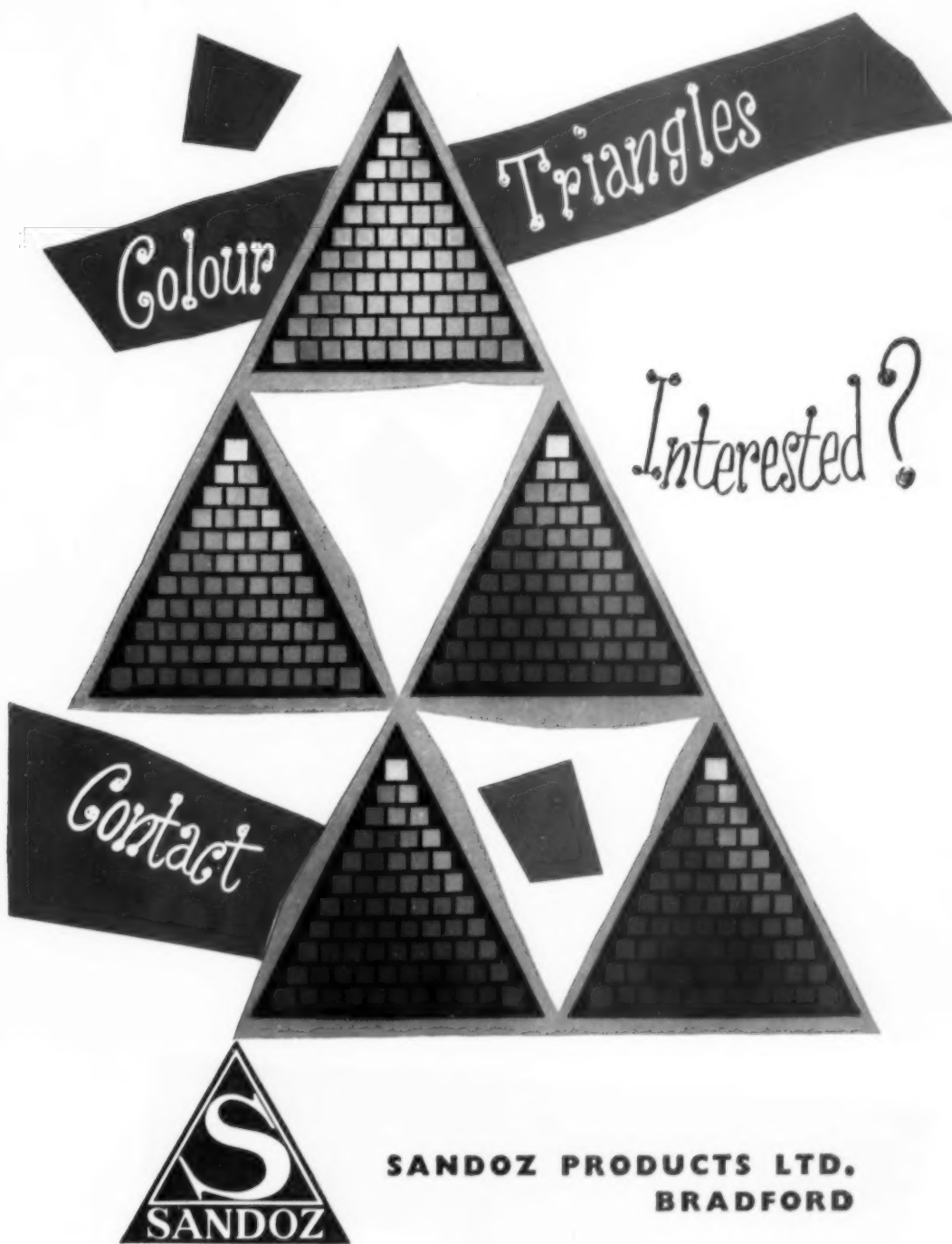
LONDON SECTION. Dinner and Dance. Waldorf Hotel, London, W.C.2.

### Tuesday, 21st January 1958

HUDDERSFIELD SECTION. *Tests for Colour Vision.* F. Jordinson, Esq., M.Sc., F.R.I.C., F.S.D.C. and T. Minshall, Esq., A.M.C.T., A.T.I. (Dyeing Department, Technical College, Huddersfield). (Joint Meeting with the Huddersfield Section, Royal Institute of Chemistry.) Silvios Cafe, Westgate, Huddersfield. 7.30 p.m.

SCOTTISH SECTION. *Flame-resistant Finishes.* J. R. W. Perfect, Esq., B.Sc. (Bradford Dyers' Association Ltd.). St. Enoch Hotel, Glasgow. 7.15 p.m. Developments with the use of phosphorus-containing resins.





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Volume 73 Number 10

OCTOBER 1957

Issued Monthly

## Examination for the Associateship (A.S.D.C.) 1957

The fourth examination for the Associateship of the Society of Dyers and Colourists was held in May and June 1957, and below appear the question papers and the report of the Examinations Board. It is hoped that publication of these papers and the report will be helpful both to prospective candidates and to teachers, and that it will serve to inform members of the Society and others of the standard of knowledge expected from candidates for the Associateship.

### Examination Papers

*Papers A and B are taken by all candidates; but Papers C, D, and E are taken by a candidate only in his chosen branch of tinctorial technology. Further, in Paper E a candidate has a choice of subject—analytical and testing techniques or the organisation of production and economics\**

#### Paper A

#### General Chemistry and Properties of Dyes, Pigments, Auxilliary Products General Chemistry and Properties of Organic High Polymers

10 a.m.–1 p.m. on Thursday, 30th May 1957

*(SIX questions only to be attempted, three from each section of the paper)*

##### SECTION I

1. Write notes on the chemical structure and mode of action of **three** of the following four groups of substances—

- (a) Gas-fume fading inhibitors
- (b) Carriers for the dyeing of polyester fibres
- (c) Cationic fixing agents for direct dyes on cotton
- (d) Reducing agents used in discharge printing.

2. Describe in detail the diazotisation of an anilinesulphonic or naphthylaminesulphonic acid, and the tests to be applied at each stage of the process. What types of dyes are made from the diazo compounds so formed?

3. Give the constitution and an outline of the preparation of an azo acid dye, an azo basic dye, and an azo metachrome or afterchrome mordant dye. Discuss the part played by substituent groups present in each dye in determining its dyeing properties.

4. How is " $\beta$ -oxynaphthoic acid" (3:2-hydroxynaphthoic acid) made and converted into products

used in azoic dyeing and printing processes? What technical advantages do these products have compared with  $\beta$ -naphthol?

5. Describe the preparation of a dye of the Patent Blue type, and compare its properties with those of other acid dyes of the same chemical class.

6. Discuss the methods by which phthalocyanine derivatives may be converted into dyes for textile fibres.

7. Give the formula of a typical anthraquinone vat dye, stating how it is made and what are its properties.

8. Describe the preparation of the intermediates used in making quinizarin. Outline the manufacture of quinizarin and also that of two dyes prepared from it which are used for different fibres.

##### SECTION II

9. "In an additive polymerisation, high polymer is formed almost immediately and long reaction times do not appreciably increase the molecular weight. In a condensation polymerisation long reaction times are essential for high molecular weights." Discuss these statements.

10. Write concise explanatory notes on **four** of the following—

- (a) Isotactic polymer
- (b) Polyelectrolyte
- (c) Block copolymer
- (d) Denaturation
- (e) Polyfunctionality
- (f) Copper number.

\* In Branch 6 only Paper E(1) was required

11. Define the terms *specific viscosity* and *intrinsic viscosity*. What information about a polymer may be obtained from measurements of the viscosities of dilute solutions of the polymer?

12. Discuss **either** the factors affecting the solubility or swelling of polymers in liquids **or** the relations existing between the structure and the physical properties of polymers.

13. Give an account of **either** the structure of phenolic resins **or** the action of aqueous solutions of sodium hydroxide on cellulose.

14. Write a brief essay on **one** of the following topics—

- (a) Chain folding in proteins
- (b) Polyamides
- (c) Vulcanisation.

### Paper B

#### Theories of Colour

#### Relation of Colour to Constitution

#### Colour Assessment and Colour Fastness

2-5 p.m. on Thursday, 30th May 1957

(SIX questions only to be attempted)

1. Optical estimation of dye solutions depends on Beer's law. State this law and discuss the reasons for the departures from Beer's law observed in practice, including instrumental defects in absorptimeters and spectrophotometers.

2. What is *whiteness*? Describe how you would attempt to determine by physical measurements the whiteness of a series of bleached fabrics. How would your results be affected if some of the patterns had been treated with a fluorescent brightening agent?

3. You are asked by the management of a dyeing firm to introduce physical colour measurement into the dyehouse. What type of instrument would you install, what aspect of the work would you attempt to control by this instrument, and why? Consider the cost of the instrument in relation to the value of the results obtained.

4. Select any colour atlas with which you are familiar and describe the principles upon which the patterns are arranged. What are the defects of this atlas?

5. What is meant by *colour tolerance*? How is it determined under any particular set of conditions? How would you specify the colour of a green signal glass to include the permitted colour tolerance?

6. Explain briefly the meaning of **four** of the following terms—

- (a) Extinction coefficient
- (b) Colour temperature
- (c) Additive colorimetry
- (d) Standard observer
- (e) Complementary colours
- (f) Dichroic colours
- (g) Protanopia.

7. A disc may be covered, in segments of varying area, with black, white, or coloured papers having the trichromatic specifications shown in the table below. When the disc is spun the colours fuse, and by varying the area and the colour of the segments a wide range of colours can be matched. The grey sample can be matched with the black and white papers. What is the proportion of the area of the disc covered with white when a match is obtained? Is it possible to match this same grey using the three coloured papers only? If not, how could a match be obtained in this case?

Sample	x	y	Y
Grey sample ...	0.33	0.33	0.40
White paper ...	0.33	0.33	0.92
Black paper ...	0.33	0.33	0.08
Red paper ...	0.70	0.30	0.28
Green paper ...	0.30	0.60	0.35
Blue paper ...	0.20	0.20	0.12

8. An indicator has the absorption spectra shown in the table below in strongly acid, strongly alkaline, and neutral solutions. What are the colours of the acid and alkaline solutions? What proportions of the acid and alkaline forms are present at pH 7.0? What is the significance of the constant optical density at 500 m $\mu$ ?

Wavelength (m $\mu$ )	Optical Density of Acid	Optical Density of Alkaline	Optical Density of Neutral (pH 7.0)
400	0.13	0.03	0.06
430	0.64	0.10	0.26
450	0.78	0.19	0.36
470	0.66	0.15	0.31
500	0.31	0.31	0.31
530	0.13	0.53	0.41
550	0.06	0.62	0.45
570	0.02	0.58	0.42
600	0	0.28	0.20

9. How would you follow continuously the uptake of a direct dye by a piece of Cellophane sheet, and what precautions would you take to ensure accuracy?

10. Describe a spectrophotometer, illustrating the disposition of the various components by means of a sketch. What range of wavelengths should such an instrument cover if it is required for general use in a dyehouse or in dye manufacture? What are the relative merits of expressing the light absorption in terms of—(a) transmission, (b) optical density, and (c) logarithm of optical density?

11. Atoms and simple molecules show sharply defined line spectra, whereas the absorption spectra of dyes consist of a number of absorption bands covering a wide range of wavelengths. Discuss briefly the main factors which give rise to these broad absorption bands. How does the absorption spectrum of a dye solution change when it is cooled to very low temperatures and why?

12. Discuss **one** of the following statements—

- (a) Colorimetry is of no value in a practical dyehouse

- (b) The introduction of the grey scale represents a great advance in the assessment of small colour differences
- (c) The relationship between colour and constitution is too complex to be of any practical value.

## BRANCH 1—TINCTORIAL TECHNOLOGY AS APPLIED TO TEXTILES

### Paper C

#### Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.—1 a.m. on Friday, 31st May 1957

(Six questions only to be attempted, of which at least ONE should be taken from Section I)

#### SECTION I

1. How would you determine the standard affinity and the heat of dyeing of a disperse dye on secondary cellulose acetate?
2. Discuss critically work published during the past few years on **either** (a), (b), **or** (c)—
  - (a) The influence of the molecular and fine structure of (i) polyamide fibres, (ii) polyacrylonitrile fibres on their dyeing behaviour.
  - (b) The explanation of the absorption and retention of dyes by fibres in terms of the formation of non-polar bonds
  - (c) The relation between concentration and diffusion coefficient for direct dyes in cellulose fibres.

#### SECTION II

3. Compare the methods by which insoluble azo dyes are normally produced on cotton and Terylene respectively, in order to yield full and uniform colorations. Why are differences in these methods necessary?
4. Discuss the advantages and drawbacks of the various forms of phthalocyanine dyes in textile printing. How are these related to the physical and chemical properties of the dyes themselves?
5. Upon what principles may high-temperature dyeing be recommended for cellulosic, protein, and synthetic fibres respectively? What disadvantages may accompany the use of methods of this kind?
6. Write a short account of **one** of the following—
  - (a) The effects of light upon vat-dyed cellulosic materials
  - (b) The effect of repeated laundering of dyeings and prints with preparations containing fluorescent brightening agents
  - (c) The choice of dyes for fabrics later to receive crease-resist finishes.

7. Discuss the functions of steaming in textile printing.

8. The Society and the AATCC are issuing a new *Colour Index*, which is distinguished from earlier works by (i) the large number of dyes included and (ii) extended data on dyeing and fastness properties. Discuss the value, immediate and potential, of a work of this kind to the dyer.

9. How do the changes brought about by (a) scouring and bleaching, (b) mercerisation, affect the dyeing behaviour of cotton yarns? In what directions, therefore, must these operations be controlled in order to produce dyeings of normally acceptable quality?

10. Outline the dyeing behaviour of the following mixtures of fibres—

- (i) Wool and Orlon
- (ii) Terylene and Ardil
- (iii) Cotton and viscose rayon.

11. Summarise the chemical methods by which the dyeing properties of wool may be modified, and comment on their application as a means of producing multicoloured fabrics by piece dyeing.

12. The dye Orange II is progressively absorbed by wool from a dilute aqueous solution at pH 3 until transfer of dye from aqueous phase to fibre is virtually complete. Outline the mechanisms that have been suggested to account for this behaviour.

### Paper D

#### Industrial Procedures and Plant

2–5 p.m. on Friday, 31st May 1957

(SIX questions only to be attempted)

1. Outline the developments in machinery which have enabled yarn and cloth to be dyed at temperatures above 100°C.
2. Write a short essay on **one** of the following topics—
  - (a) Steam economy in the dyehouse
  - (b) The removal of water from dyed textiles
  - (c) Methods used for softening water for dyeing purposes.
3. How would you prepare and dye the following fabrics—
  - (a) A cotton shirting fabric
  - (b) A nylon locknit fabric
  - (c) A cellulose acetate poult?

What standards of fastness are required for the finished fabrics?

4. Describe in detail a modern pad mangle. How does it differ from the older type? Explain briefly for what purposes pad mangles are used in a dyeing and finishing plant.



5. What do you understand by the phrase *resin-bonded pigments*? Discuss the advantages claimed for the use of resin-bonded pigments in printing, the methods by which they are applied, and their general fastness properties.

6. Give a detailed account of the methods used for dyeing and finishing nylon hose.

7. Recently, reactive (Procion, ICI) dyes have become available. How do these dyes differ from the direct dyes? Describe in detail a method for applying them to cotton piece goods.

8. Give a short account of the properties of the metal-complex acid dyes and describe the methods by which they are applied to wool piece goods.

9. Comment on the practical difficulties likely to be encountered in dyeing a medium depth of a vat blue on viscose rayon (a) in skein form, (b) in cake form. Describe in detail the dyeing procedures you would use to avoid these difficulties.

10. Give a brief account of the substances used for sizing cotton, rayon, and synthetic-fibre warp yarns. How would you desize fabrics containing the various sized yarns preparatory to dyeing?

11. Describe in detail how you would dye **two** of the following blend fabrics to a solid medium blue in a winch machine—

- (a) Cotton and wool
- (b) Cotton and viscose rayon
- (c) Viscose rayon and cellulose acetate
- (d) Viscose rayon and Orlon.

12. Compare in general terms discharge styles with resist styles in printing. A white pattern on a fast-dyed black ground is to be produced on a continuous-filament viscose rayon satin. What factors would be considered in order to decide whether a resist or a discharge method should be employed?

13. Discuss **either** (a) **or** (b)—

- (a) Recent developments in the mechanisation of screen printing
- (b) Recent modifications in the design of roller printing machines.

### Paper E

10 a.m.–1 p.m. on Saturday, 1st June 1957

(Either Paper (i) or Paper (ii) to be attempted)

#### (i) Analytical and Testing Techniques

(FIVE questions only to be attempted)

1. Outline the methods generally used for the quantitative chemical estimation of the purity of azo dyes and their intermediates. Discuss critically the methods quoted in the light of later modifications which have been proposed.

2. What properties of a crease-resist-treated fabric are of the greatest importance to the consumer? Outline the tests which can be applied to assess the quality of a commercial crease-resist-treated fabric.

3. Describe the methods available for the assessment of the water-repellency of shower-proofed fabrics. Draw sketches of the apparatus described and give essential experimental details.

4. Compare the methods which have been recommended for (a) the estimation of hydrosulphite strength, (b) the control of hydrosulphite in vat dyebaths.

5. Discuss the value of the assessment of the light fastness of dyed textiles using B.S. 1006 with reference to—

- (a) The use of the grey scale
- (b) The efficacy and conditions of operation of fading lamps
- (c) The modification of fading lamps to allow assessment of fastness to weathering.

6. Give an account of **two** different methods in each case for the quantitative estimation of any **two** of the following organic materials—

- (a) Formaldehyde
- (b) Urea
- (c) Acetyl value of cellulose acetate
- (d) Nitrogen content of cellulose nitrate
- (e) Aniline
- (f) Phenol.

7. Outline the methods employed for determining the felting-shrinkage of shrink-resist-treated wool knitted fabrics or garments. Briefly describe the staining tests used for detecting such treatments and for estimating their severity and uniformity.

8. Tabulate the tests which would be necessary to determine (a) the dyeing class, (b) the chemical class of an unknown dye in substance. Describe the results which these tests would give with the following dyes—

- (i) Malachite Green
- (ii) Solway Green G
- (iii) Coomassie Green T
- (iv) Caledon Jade Green XN
- (v) Carbolan Green G
- (vi) Chlorazol Green G
- (vii) Solochrome Green G
- (viii) Wool Green S
- (ix) Cibacron Green G.

9. Give details of—

- (a) The detection of traces of residual *p*-phenylenediamine in dyed textiles or fur
- (b) The quantitative analysis of bulk supplies of *p*-phenylenediamine
- (c) The detection of dyes containing a *p*-phenylenediamine structure.

10. A sample of cotton fabric, flameproofed with a borax-boric acid mixture, was extracted with boiling water, and the extract after cooling made up to 250 ml. One half of this solution was titrated against 0.1 N. hydrochloric acid, using Methyl Orange as indicator, and was found to require 10.5 ml. of acid. To the second half of the solution was first added the same volume (10.5 ml.) of 0.1 N. acid together with approx. 15 ml. of glycerol, and the total boric acid was determined by titration with 0.1 N. caustic soda using phenolphthalein as indicator. The volume of 0.1 N. alkali required was 21.75 ml. The extracted fabric, after drying, weighing, and calculating to normal regain (8.5%), was found to weigh 5.307 g.

From these figures calculate (a) the percentage of extractable proofing salts on the proofed fabric, (b) the ratio of borax to boric acid in the original proofing solution. (c) Comment on the efficiency of the flame- and smoulder-proofing of the fabric, and the possible effect this particular proofing finish has upon other physical properties of the fabric.

11. Discuss the advantages and the disadvantages of any two methods for the determination of residual alkali in wool.

12. The following figures represent the foot-length in inches of two batches of knitted half-hose after two different processings—

Batch A		Batch B	
Length	Number	Length	Number
6.7	1	6.9	2
6.8	6	7.0	10
6.9	18	7.1	10
7.0	28	7.2	15
7.1	13	7.3	15
7.2	6	7.4	13
7.3	2	7.5	8
7.4	1	7.6	1
		7.7	1

- Construct for each batch (i) a frequency polygon and (ii) a histogram
- Calculate in each case the coefficient of variation
- Ascertain whether there is any statistically significant difference between the two batches.

## (ii) Organisation of Production and Economics

(FIVE questions only to be attempted)

1. "The planning and progress department fulfils a very important function." Discuss this in relation to the organisation, methods, and some of the problems of efficient running in a medium-sized works.

2. Write a short essay on **one** of the following topics—

- Works committees
- Piece work
- Accident prevention.

3. "The key position in industrial relations is that occupied by the foreman or chargehand." Discuss this statement and suggest how he might be selected and trained.

4. Describe the ideal layout of a medium-sized dyeworks or printworks, and draw a staff and line diagram of duties and responsibilities.

5. Explain what you understand by *work study*. Give an example.

6. "There are three stages in quality control—specification of quality, verification, and recovery of waste." Discuss this statement as applied to a typical works.

7. Write an essay on **one** of the following—

- Fuel economy
- Care of plant
- Materials handling.

8. "The costing department is dependent on information supplied by the management and foremen." Explain and amplify this statement.

9. What function is served by the merchant converter?

10. Demand in dyeing and printing is tending to become more seasonal. Discuss this change and suggest means of levelling out this demand.

## BRANCH 6—TINCTORIAL TECHNOLOGY AS APPLIED TO COATED FABRICS, LEATHERCLOTHS, LINOLEUM, Etc.

### Paper C

#### Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.—1 p.m. on Friday, 31st May 1957

(FIVE questions only to be attempted)

1. Compare the properties of compositions based on linseed oil, cellulose esters, and vinyl plastics in cloth coatings, with particular reference to end-uses.

2. Describe the manufacturing processes used to prepare the colouring matter for incorporation into a coating composition, from the stage of the dry pigment to the final blend. Why is it sometimes desirable to modify the flow properties of pigment dispersions, and what steps may be taken to do this?

3. Describe the essential steps in the preparation of the coating material and in the coating process for **one** of the following—

- Linoleum
- "American" cloth
- Vinyl plastic leathercloth.

4. Describe the fabric constructions which may be used for the bases for coated cloths, and

outline the properties of each. Show how the practical life of the product can depend upon the cloth structure.

5. Discuss the factors affecting the adhesion between coating materials and base fabrics. What special problems arise with synthetic-fibre fabrics and how may they be resolved?

6. Write briefly on **three** of the following materials as coating media, indicating their special properties and uses—

- (a) Neoprene
- (b) Chlorosulphonated polyethylene
- (c) Butadiene-acrylonitrile rubbers
- (d) Silicones
- (e) Polyurethans.

7. Discuss the application of colorimetry to colour-matching in the coated-fabrics industry.

8. Write brief notes on the various metal soaps used as stabilisers for polyvinyl chloride. What additions may be made to the stearates to improve their action as heat stabilisers?

9. Compare the aryl phosphates and the phthalates as plasticisers for polyvinyl chloride. What plasticisers are suitable for the formulation of a polyvinyl chloride coating required to be flexible at low temperatures, and what other factors must be considered?

10. In use leathercloths may become degraded through external agencies. Suggest possible causes of the following changes—

- (a) A blue-coloured nitrocellulose leathercloth became yellow when exposed to tropical conditions
- (b) A leathercloth stuck to a rigid support with a rubber-based adhesive developed dark stains
- (c) The base fabric of a leathercloth claimed to be fire-resistant exhibited poor strength properties
- (d) A nitrocellulose leathercloth with a water-proofed base developed a white "bloom" during storage
- (e) A vinyl plastic leathercloth upholstery cracked unexpectedly rapidly in use in public seating.

### Paper D

#### Industrial Procedures and Plant

2-5 p.m. on Friday, 31st May 1957

(SIX questions only to be attempted, of which at least TWO should be taken from Section I)

#### SECTION I

1. Compare the types of spreading machine used for coating fabrics with—

- (a) Linseed oil compositions in the manufacture of flexible shelf cover

- (b) Rubber solutions in the manufacture of single-texture garment fabric
- (c) Polyvinyl chloride paste in the manufacture of medium-weight upholstery fabric
- (d) Nitrocellulose solutions in the manufacture of book-binding cloths.

2. Give an account of the safety measures to be observed in the manufacture of nitrocellulose-coated fabrics.

3. What methods are used for the control of the tension of fabric passing through an embossing machine? Give diagrams of embossing machines suitable for (a) polyvinyl chloride, (b) nitrocellulose coatings.

4. Describe a typical solvent-recovery plant. What are the essential points to watch to ensure efficient working?

#### SECTION II

5. Describe, with sketches, a typical four-bowl calender for the application of thermoplastic coatings to fabrics. Give some notes on the tensioning and winding-up devices and on the safety precautions to be observed.

6. What are the advantages of applying a finishing lacquer to polyvinyl chloride coatings? How may these finishing coats be applied? Describe, with sketches, at least **two** methods.

7. Describe two methods of applying a printed design to polyvinyl-chloride-coated fabric. Discuss the implications of embossing after printing.

8. What precautions would you observe in the dyeing of cotton cloths for rubberproofing? Describe the passage of such cloth through the dyehouse and give a sketch of a typical dye jig.

9. Compare the twin-roll and Banbury types of mills for the production of rubber-coating compounds.

Describe the method of making solutions from these compounds with some notes on the toxic hazards involved.

10. Give a short account of the coating, combining, and curing processes used in the preparation of a double-texture rubberproofed fabric, with some notes on the methods of wet and dry combining.

11. How is inlaid linoleum prepared? Give a flow sheet showing the processes involved.

12. Give a sketch of a typical mill used for the dispersion of pigments in oily media, with comments on the method of controlling the fineness of dispersion.

13. Make a diagram of a typical festooning machine, showing the methods of avoiding such defects as bar marks and wrinkling.

14. Why is it important to remove the fatty matter from a fabric destined for nitrocellulose coating? Discuss the necessity for a malt desizing process in this connection.

15. Give a sketch of a reverse roll coating machine as used for the application of nitrocellulose solutions to paper. What are the advantages of this type of machine over the more conventional doctor-blade types?

16. Describe, with sketches, the machinery necessary for the preparation of a pigmented nitrocellulose solution suitable for use as main coats in the production of a heavy nitrocellulose upholstery fabric. What are the considerations which might favour the use of virgin nitrocellulose instead of recovered celluloid scrap in this connection?

### Paper E (I)\*

#### Analytical and Testing Techniques

10 a.m.-1 p.m. on Saturday, 1st June 1957

(FIVE questions only to be attempted)

1. Discuss the effect of moisture, either in the atmosphere or in the raw materials, upon the manufacture of leathercloths based upon polyvinyl chloride and nitrocellulose.

Describe methods for determining moisture in (a) the solid and (b) the liquid components of both types of leathercloth. Indicate the special advantages of the methods described.

2. Describe in detail how you would determine the suitability of a pigment for use in a leathercloth based on polyvinyl chloride. Give reasons for your choice of tests.

3. Describe the accepted method of assessing the light fastness of coated fabrics, which uses the International Grey Scale. What factors affect such assessments, and what reservations must be made in their interpretation? Comment briefly on the value of accelerated light-fastness testing (i.e. with the aid of a fading lamp) compared with outdoor exposure.

4. The production department of the polyvinyl chloride leathercloth factory in which you work is experiencing persistent trouble due to penetration of the fabric by the paste (strike-through). Describe how you would seek to establish the causes of this, taking into account the fabric, the paste, and the processing.

5. Attempt **two** of the following—

(a) Discuss the methods available for the determination of the tear strength of a coated fabric; indicate which method you consider to be the most reliable and give reasons for your choice.

(b) What properties do you consider to be most important in a leathercloth to be used in making shoe uppers? How would you evaluate these properties on the finished material?

(c) Outline the analysis of an unknown printing ink designed for use on a polyvinyl-chloride-coated fabric (it is not necessary to describe the characterisation of the pigment).

(d) Describe and compare two different methods for determining the opacity or hiding power of a pigment. Comment upon the statement that "there is a wide difference in the ease with which opacity may be achieved, and with some colours it is not possible to attain it within the normal range of coating thickness—say up to 50 mils."

6. A light-coloured polyvinyl-chloride-based leathercloth, used to upholster chairs, has developed areas of dark staining after a few months of service. Describe how you would establish the cause, taking into account at least three possible factors other than dirt or similar chance contamination. Indicate what steps might be taken to prevent recurrence in future production.

7. What is *anomalous viscosity*? Describe at least two methods by which it may be measured. How may the rate of shear under a doctor blade be calculated, and how does this relate to normal test conditions in the laboratory?

8. Attempt **two** of the following—

(a) How would you determine whether the coating of a polyvinyl chloride leathercloth is adequately cured? How would you detect under- or over-curing? Comment upon the bases of the tests used.

(b) Outline two methods suitable for the measurement of the viscosity of nitrocellulose dopes.

(c) Outline two methods for determining the degree of unsaturation of an oil such as linseed oil.

(d) Describe how the gloss of a surface may be measured. What is the difference between gloss-heads designed for use in the high- and low-gloss ranges?

9. Give in detail the classification, by chemical means, of an unknown black pigment.

### BRANCH 9—PRODUCTION OF DYES, LAKES, AND PIGMENTS

#### Paper C

#### Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.-1 p.m. on Friday, 31st May 1957

(FIVE questions only to be attempted)

1. What physical properties and types of chemical structure are generally considered necessary in dyes intended for application to cellulose acetate from aqueous dispersion?

2. Write an account of the importance of phthalic anhydride to the synthetic dye industry.

3. Give examples of the preparation of a blue, a green, and a black sulphide dye, and record their uses; discuss the constitution of this class of dye.

\* Paper E (II) was not required in Branch 6.



4. Illustrate by formulae the relationship between indamines and certain azine and thiazine dyes. Give the stages in the preparation of one member of the azine class of colouring matters and state its uses.

5. Give an account of the sulphonic acids of anthraquinone, indicating the conditions under which they are formed, and their uses in the preparation of intermediates and dyes.

6. What are the principal results which follow the conversion of dyes and pigments into their metal derivatives? Give examples illustrating the mode of formation of the metal derivatives.

7. Give an account of the manufacture of metallic powders for use in the paint industry.

8. Outline the preparation of a green organic pigment and a green inorganic pigment, and compare their properties and uses.

9. Write an essay on black pigments.

10. List the types of organic dyes which are used in lake-making by precipitation on to inert bases. Describe briefly the preparation and the properties of four such inert bases.

#### Paper D

##### Industrial Procedures and Plant

2-5 p.m. on Friday, 31st May 1957

(FIVE questions only to be attempted, TWO from Section I and THREE from Section II)

##### SECTION I

1. Describe the manufacture of **either** Brilliant Green **or** Rhodamine B. How is the dye you select used for the preparation of other dyes?

2. Dye manufacture calls for the handling of corrosive, toxic, and inflammable materials. Imagine that you are works manager of a dye factory, and write notes on the precautions you would take to avoid accidents and to deal with mishaps. Illustrate your answer by reference to specific hazards and materials.

3. What methods are used to introduce metals into dyes to give metal complexes? Describe fully the manufacture of a metal-complex dye, **either** water-soluble **or** insoluble.

4. List and give examples of the main types of reaction occurring in the manufacture of vat dyes. What kinds of plant are used? Give a brief account of the manufacture of a yellow vat dye.

##### SECTION II

5. In many industrial processes replacement of batchwise by continuous operation offers advantages. In your opinion could manufacture of azo dyes be carried out efficiently in this latter way? Taking a specific process with which you are familiar, discuss possibilities and snags.

6. Write an account of the preparation of alumina. How is this used further in pigment preparation and in colour-using industries?

7. Write an essay on pH control in azo dye manufacture, indicating with reference to **either** soluble **or** insoluble dyes the likely effects of variations in pH.

8. Discuss dry grinding machinery for soluble dyes, organic pigments, and inorganic pigments. Give reasons for differences in the types used and relate these to the qualities expected in the finished products.

9. Sketch a diazo plant for unsulphonated amines, indicating constructional materials. Discuss the choice of acid used in diazotisation, indicating advantages and disadvantages.

10. Write an essay on filter-pressing in the dye industry, both for clarifying liquids and for isolating solids. How would you (a) facilitate the removal of a gelatinous impurity from a diazo solution, (b) attempt to treat a finely divided solid in suspension to improve its ease of isolation?

#### Paper E

10 a.m.-1 p.m. on Saturday, 1st June 1957

(Either Paper (i) **or** Paper (ii) to be attempted)

##### (i) Analytical and Testing Techniques

(FOUR questions only to be attempted)

1. Describe the methods which are available for determining water in organic materials, indicating the circumstances in which each method is most useful.

2. Describe the methods you would use to determine the characteristic nitrogen group in **four** of the following compounds—

- Benzonitrile,  $C_6H_5-CN$
- 1-Nitronaphthalene
- Stabilised *m*-chlorodiazobenzene
- Aniline
- Phenylhydrazine.

3. Describe briefly the tests which should be carried out to ascertain the suitability of an organic lake for colouring rubber.

4. What methods can be used to determine sodium and potassium in samples which contain both metals?

5. What is meant by an *end-point cell*? Describe the construction and the use of such a cell for the routine determination of sodium chloride in water-soluble dyes.

6. "Filter paper has become one of the most valuable of the materials used by analytical chemists". Discuss this assertion with special reference to the analysis of dyes and their intermediates.



7. How would you determine the concentration of **four** of the following poisonous gases or vapours in the air of vessels in which they had been employed—

- (a) Benzene
- (b) Hydrocyanic acid
- (c) Hydrogen sulphide
- (d) Nitrous fumes
- (e) Chlorine?

What is the significance of such tests in chemical factory practice?

8. Write an essay on **one** of the following subjects—

- (a) Infrared spectrometry as used for the analysis of intermediates
- (b) The use of ion-exchange media in analysis.

## (ii) Organisation of Production and Economics

(FIVE questions only to be attempted)

1. List the departments to be provided in the organisation of a factory for the production of

dyes, lakes, and pigments, and state briefly the function of each.

2. What do you understand by the term *production control*? Outline a system of production control applicable to the manufacture of dyes, lakes, and pigments.

3. What is the meaning of *labour turnover*? Enumerate some causes and discuss the economic effects of a high labour turnover.

4. Discuss the elements of total cost which must be recovered in the selling price of a manufactured product.

5. What are the responsibilities of a foreman in a production plant?

6. Discuss the possible applications of bulk handling in a medium-size factory producing dyes or lakes and pigments.

7. What is the value of a works committee? What subjects can it usefully discuss?

8. Discuss briefly "Profit Sharing as an Incentive".

9. Outline the principles of method study.

## Report of the Examinations Board

The examination was held at Belfast, Bradford, Leicester, Manchester, and Paisley on 30th and 31st May and 1st June. Of the 39 candidates, 18 took Papers A and B only, 14 took the whole examination, and 7 completed the examination by taking Papers C, D, and E. The 21 in the last two groups were made up of 16 examined in Branch 1 (Textiles), 1 in Branch 6 (Coated Fabrics), and 4 in Branch 9 (Manufacture of Dyes and Pigments). Nineteen of these 21 satisfied the examiners.

### General Comments

(i) The standard, as reflected in the results, was generally good, and there were very few really weak candidates.

(ii) There is evidence that some candidates attempt Papers A and B without adequate basic preparation and do not appreciate the standard required. One or two suffered from an attempt to prepare simultaneously for examinations of a different kind.

(iii) The Board would like to see a greater capacity to discuss technical matters critically and to write well ordered and logical answers really directed to the requirement of the questions. It would also like to see more evidence of widespread reading and of acquaintance with modern technological and scientific developments, especially in directions outside the limited field of the candidate's own everyday work.

(iv) Handwriting, spelling, and grammar, subjects of unfavourable comment last year, have distinctly improved.

(v) The Board was particularly impressed by the result of interviews with candidates, most of whom, in demeanour and during free discussion,

were able to speak up well for themselves and showed themselves to be responsible and thoughtful. It is gratifying that, at present, the proportion of unsuitable candidates who present themselves for examination is very small.

The following notes on performance in the different papers are based on the reports of the respective examiners.

### Paper A

#### SECTION I

Outstanding papers were few. The majority showed reasonable grasp of the subject, but the standard required is not universally appreciated.

#### SECTION II

(i) Preparation for this part (High Polymers) was more complete than that for Section I (Colouring Matters), and candidates in the future should attempt to keep their studies in better balance.

(ii) It should be understood that much polymer chemistry requires a sound background of physical chemistry.

(iii) The examiners do not feel it to be healthy, or to meet the requirements of the examination properly, that so many candidates should tend to neglect other aspects of polymer chemistry in favour of those concerned directly with fibre-forming polymers.

(iv) Candidates answering Question 11 did not fully understand the information that can be obtained from viscosity measurements.

(v) In dealing with factors which influence solubility and swelling, attention was usually confined to water. Accounts of the action of

caustic soda on cellulose were confined almost entirely to the phenomena of mercerisation, the formation of alkali cellulose and degradation by gaseous oxygen being neglected.

(vi) The question on polyamides was popular but evoked an account of the preparation of nylons with inadequate treatment of their structures and properties.

### Paper B

More than half the candidates showed adequate grasp of the subject, but there was a wide spread between the highest and the lowest marks. Comments on individual questions are as follows—

(1) Generally poor answers. Few candidates appreciated the disturbing influence of stray light in optical instruments.

(2) Badly answered. No candidate seemed to have exact knowledge of the measurement of whiteness, and all attempted to answer from general principles. The importance of blueness in a white was infrequently brought out.

(3) Answered quite well.

(4) There was lavish use of diagrams. Nearly all candidates concentrated on describing the Munsell Color Atlas, but none appeared to understand the principles on which the patterns are arranged.

(5) Only 5 of the 32 candidates attempted this question, but all except one answered it well.

(6) This was an easy question and was attempted by most of the candidates, but the quality of the answers was very variable.

(7) A simple question, attempted by 8 candidates, who gave good answers marred by careless arithmetic.

(8) Widely attempted with variable results. Many candidates could not interpret spectra correctly, and although the isobestic point was referred to, its significance was not generally understood. Nearly all candidates approached the problem by adopting the general formula for determining the proportions of two dyes in a mixture, using simultaneous equations, and ignored the fact that the total dye concentration in an indicator system of this kind is constant. Only one candidate realised that at 600 m $\mu$  the optical density of one component is zero, and that the problem is then an exercise in simple division.

(9) Badly answered by all except one candidate. The significance of "continuously" in the problem was not appreciated, nor the fact that the substrate is a continuous sheet.

(10) Descriptions and sketches of the spectrophotometer were very good. Two candidates described a colorimeter instead. Few candidates appreciated the use of the concepts—transmission, optical density, and logarithm of optical density.

(11) Although only a few candidates attempted this question on colour and constitution, it was answered better than similar questions in previous years.

(12) A sound approach in general to the debatable topics raised by the question.

## BRANCH 1—TEXTILES

### Paper C

This paper was taken by 16 candidates, the level of performance being generally very uniform, with few incompetent performances. There is still too little confidence in approaching fundamental topics. Where answers were based on personal experience, some were very good. Comments on individual questions are—

(1) Although dyeing theory had been studied, the performance in this question showed that more attention must be given to such topics. The examiners feel that good knowledge of current theory is essential in a professional examination.

(2) The standard was moderate. No answer to (c) was attempted. There was little knowledge about theories based on studies of molecular models.

(3) The general standard was good, but clear distinctions were not made by many among the reasons for the different conditions of application with the various kinds of fibre.

(4) Attempted by very few candidates. Knowledge of these dyes should be more widespread.

(5) Evidence was given of wide reading and ability to assess the position fairly.

(6) (b) was answered best. Knowledge of the action of light on dyed textiles was not very detailed.

(7) There were two very good answers.

(8) More widespread knowledge of the plan and the objects of the *Colour Index* is desirable among younger members.

(9) On the whole, disappointing. There was no evidence of acquaintance with modern work on the structure and the properties of the cuticle, nor of its influence in the processes mentioned.

(10) Only two good answers. Information was often incomplete and badly arranged.

(11) Only one good answer. Several candidates limited their consideration to chlorination. Details of the chemical process were given, although they were not required.

(12) Some good answers.

### Paper D

The standard of the answers was higher than last year, but some candidates showed poor knowledge of chemistry; e.g. calcium carbonate was said to be soluble in water. Some comments are—

(i) Archaic terms like "spirits of salt" and "gill of vitriol" overdo the industrial atmosphere.

(ii) Although some industrial procedures were well described, there was much ignorance about others and a great deal of guessing.

(iii) Other evidence of lack of direct knowledge of processes includes the suggestion that knitted nylon fabrics should be dyed in the jig, ignorance of the importance of heat-setting, the statement that both the Standfast and the Pad-Roll systems dye at temperatures above 100°C., and lack of knowledge of the composition of sizing materials and methods for their removal.

### Paper E(i)

Eleven candidates took this paper, of whom 5 were fairly good and 3 were poor. There was evidence of lack of basic knowledge and personal experience of analytical methods, ignorance of published work on the more important methods of textile testing, and deficiency in the power to discuss methods and results critically. These deficiencies are regarded as serious in an examination of this kind. Where the experience cannot be gained in the candidate's own day-to-day work, it is suggested that facilities for analytical studies, comparable for instance with those provided for colour theory, should be more widely available.

Only one candidate answering Question 5 knew about the application of *B.S.* 1006 in testing for fastness to light, and some confused the grey scale with the eight blue standards. Ignorance of this kind is disappointing, because since 1951 the Society has published 22 sponsored articles on fastness testing besides other contributions. Only one of the two candidates who attempted Question 6 gave a satisfactory answer. Question 8 was badly answered. The numerical question on statistical analysis (12) elicited only three poor answers. The

other numerical question (10), although it was no more difficult than those set in an Intermediate Science examination, resulted in one very poor attempt.

### Paper E(ii)

Five candidates took this paper, an increase on last year. There were one very good and one good set of answers, the rest being adequate. Only one candidate gave evidence of special preparation, the others relying on their powers of observation and reasoning.

If this paper is to have real significance, and to get the candidates to equip themselves better for management, there should be more serious study. Question 9 was not attempted, and Question 10 was attempted by one candidate only. Question 3 was answered fairly competently by most candidates. The answers to Question 4, attempted by most of the candidates, showed a generally poor knowledge of the chain of function and responsibility.

C. O. CLARK (*Chairman*)

R. L. ELLIOTT      C. B. STEVEN      H. A. TURNER  
W. PENN      J. V. SUMMERSGILL      T. VICKERSTAFF

Lists of candidates recommended for election as Associates are given on p. 465.

## COMMUNICATIONS

### The Effect on Wool of Boiling in Aqueous Solutions III—Acids and Acidic Salt Solutions

R. V. PERYMAN

Worsted yarn of 64s quality is boiled at controlled pH values and for times simulating commercial dyeing in a package-dyeing machine using sulphuric, phosphoric, formic, acetic, oxalic, and hydrochloric acids with and without salts. Changes produced in the wool, as measured by alkali solubility or alternatively by urea-bisulphite solubility, are related to the pH value of the treatment solution at 100°C., which is obtained by extrapolation of measurements at lower temperatures. Sulphuric acid is found to be the most active of the acids but, in terms of the pH value of the cooled solution, sodium sulphate-sulphuric acid solutions are exceptional in having an "apparent" protective action, which is attributed to the rise in pH with rise in temperature. Practical implications are discussed.

#### INTRODUCTION

The addition of a neutral salt to an acidic solution in contact with wool would be expected to increase the uptake of acid and, with increasing acidity, promote successively amide and peptide hydrolysis. The physical chemistry of these reactions, especially with regard to the sorption of acid, has been studied in detail within the temperature range 0–50°C. by Steinhardt, Fugitt, and Harris<sup>1</sup>. Elöd, Nowotny, and Zahn<sup>2</sup> have studied chemical and physical changes in wool which has been treated with acid solutions at temperatures up to 100°C., but their conditions differ in some respects from those of commercial dyeing. Dusenbury, Mercer, and Wakelin<sup>3</sup> have used alkali solubility and physical tests to determine the effect of boiling in a sulphuric acid solution. More recently Schönplugg<sup>4</sup> and Würz<sup>5</sup> have examined the changes produced by boiling in "blank" dye liquors; other studies relating to dyeing are listed in the first paper of this series<sup>6</sup>. The need remains, however, for further work on the changes produced in wool by acid dyeing, and in particular by acid solutions containing salts.

Steinhardt *et al.*<sup>1</sup> chose conditions for equilibrium to be reached between wool and solution, and so they used mostly low temperatures to avoid irreversible reactions; but commercial dyeing usually takes place at temperatures near 100°C., and strict equilibrium is not attained because the hydrolytic reactions can become considerable at these temperatures. Moreover, when pH values are measured near room temperature after cooling from 100°C., the pH shifts due to temperature-dependent dissociation constants of acids can be important in salt-acid solutions<sup>7</sup>. Thus it now seems that an explanation of an observation made in a previous paper<sup>6</sup>, that the addition of sodium sulphate to boiling solutions of dilute sulphuric acid has little effect on the damage caused to wool, should be sought in pH changes between temperature of measurement and temperature of use. As the earlier results are too few, some of the following experiments have been designed to test the above hypothesis.

#### EXPERIMENTAL

Worsted yarn (11 g.) of 2/14s count, made from the same lot of 64s tops as used previously<sup>6</sup> and

scoured in the same way, was cross-wound by hand on the outside of a package (190 g.) made from tubular knitted fabric of similar wool quality, scoured in a similar way, and wound on a stainless-steel cage. The load, previously wetted-out in warm distilled water, was equilibrated, using a liquor ratio of 50:1, in a Thies pressure dyeing machine for 90 min. at about 30°C. and a pH value calculated to give the desired pH value during the boiling process. The equilibration pH values were necessarily higher than the corresponding pH values of the treatment solutions and, in the

instance of the sulphate treatments, were higher by approx. 0.02, 0.1, and 0.3 pH unit for treatments at pH 1.8, 2.4, and 3.0 respectively. After the load had been removed from the machine, the liquor, readjusted in pH, was brought to the boil and the load re-entered. This caused the temperature to fall to 95°C., but the boil was reached again in 1 min. Circulation of liquor was in-to-out for the first minute and out-to-in for the remainder of the 90-min. boiling period.

Samples of liquor were taken at 15-min. intervals and cooled to 20°C., and the pH was measured and

TABLE I  
Effect of Boiling on Alkali Solubility and Urea-Bisulphite Solubility

Acid	Salt	Solution	Concn. of Salt (g./litre)	(M.)	20°C.	pH at 100°C.	Duration of Boiling (min.)	Alkali (%)	Solubility in Urea- Bisulphite (%)
No treatment ...	...	...	...	...	—	—	—	13.4	46.9
SODIUM SULPHATE-SULPHURIC ACID SOLUTIONS									
H <sub>2</sub> SO <sub>4</sub>	—	—	—	—	1.82	1.93*	90	50.6	—
	Na <sub>2</sub> SO <sub>4</sub>	1.5	0.011	—	1.82	2.11	90	45.3	—
		4.5	0.032	—	1.82	2.36	90	45.8	—
		9.2	0.065	—	1.82	2.53	90	41.1	—
H <sub>2</sub> SO <sub>4</sub>	—	—	—	—	2.40	2.49*	90	27.1	—
	Na <sub>2</sub> SO <sub>4</sub>	1.5	0.011	—	2.40	2.91	90	25.7	—
		4.5	0.032	—	2.40	3.13	45	20.7	—
		4.5	0.032	—	2.41	3.14	90	24.8	—
		4.5	0.032	—	2.40	3.13	180	29.4	—
		4.5	0.032	—	2.41	3.14	270	36.9	—
		4.5	0.032	—	2.40	3.13	360	42.2	—
		9.2	0.065	—	2.43	3.22	90	24.7	—
		18	0.13	—	2.41	3.28	90	22.8	—
H <sub>2</sub> SO <sub>4</sub>	—	—	—	—	3.01	3.05*	90	20.4	—
	Na <sub>2</sub> SO <sub>4</sub>	1.5	0.011	—	2.97	3.60	90	20.9	51.4†
		4.5	0.032	—	2.93	3.75	90	20.5	50.2†
		9.2	0.065	—	2.96	3.81	90	20.4	48.8†
OTHER STRONG ACIDS AND THEIR SALTS									
HCl	—	—	—	—	2.42	2.44*	90	19.3	—
HCl	NaCl	11.34	0.194	—	2.42	2.44*	90	30.0	—
H <sub>3</sub> PO <sub>4</sub>	—	—	—	—	2.42	2.56*	90	19.0	—
H <sub>3</sub> PO <sub>4</sub>	NaH <sub>2</sub> PO <sub>4</sub>	7.77	0.065	—	2.41	2.74	90	24.9	—
H <sub>3</sub> PO <sub>4</sub>	NaH <sub>2</sub> PO <sub>4</sub>	23.3	0.194	—	2.42	2.76	90	31.6	—
Oxalic	—	—	—	—	2.42	2.47*	90	22.8	—
Oxalic	(COONa) <sub>2</sub>	—	0.065	—	2.42	2.55	90	33.4	—
SODIUM SULPHATE WITH WEAK ACIDS									
Formic	Na <sub>2</sub> SO <sub>4</sub>	1.5	—	—	3.36	3.87	90	—	46.6
		1.5	—	—	3.34	3.85	180	—	48.8
		1.5	—	—	3.34	3.85	360	—	54.7
		9.2	—	—	3.34	3.94	90	—	39.4
Acetic	Na <sub>2</sub> SO <sub>4</sub>	1.5	—	—	4.51	5.05	90	—	30.7
		1.5	—	—	4.51	5.05	180	—	31.8
		1.5	—	—	4.51	5.05	360	—	26.2
		9.2	—	—	4.52	5.18	90	—	32.1
WEAK ACIDS AND THEIR SALTS									
Formic	—	—	—	—	2.42	2.54*	90	18.5	—
Formic	—	—	—	—	3.34	3.43*	90	—	30.9
Acetic	—	—	—	—	4.55	4.64*	90	—	24.8
Acetic	CH <sub>3</sub> -COONa	—	0.032	—	4.54	4.67	90	—	25.2
Acetic	CH <sub>3</sub> -COONa	—	0.032	—	5.95	6.17*	90	—	20.4
Deionised water	—	—	—	—	—	—	90	—	22.7

\* Calculated

† One determination only



acid added if necessary to maintain constant pH. After allowance for the small samples taken for pH measurement, evaporation losses were made up with boiling deionised water. All solutions were prepared with filtered, deionised water, and the chemicals were of "chemically pure" grade or better where necessary. The sodium sulphate was anhydrous. The pH values were measured with glass electrodes, those at 100°C. being obtained by measurements with a high-temperature electrode at 85° and 95°C. and extrapolation to 100°C. The reference buffer solution was 0.05 M. potassium hydrogen phthalate, the pH of which was taken as 4.00, 4.18, and 4.22 at 20°, 85°, and 95°C. respectively<sup>8</sup>.

The load, when boiled at pH values below 3 (measured at room temperature), was subsequently neutralised in a dilute solution of pyridine. After rinsing and hydroextracting, the yarn was wound off wet in order to avoid setting effects, and then conditioned in the humidity room.

The procedure followed for the alkali-solubility determinations was that of Harris and Smith<sup>9</sup>, and for urea-bisulphite solubility that of Lees and Elsworth<sup>10</sup>.

#### RESULTS

The results are given in Table I. Each solubility result is the mean of two or more determinations.

For convenience the time of boiling was limited to 90 min. for most of the treatments, but opportunity was taken to show the effect of longer treatments in three instances. The use of the boil caused some variations in temperature of treatment, but this came within  $99.8 \pm 0.3^\circ\text{C}$ . An exceptionally high sodium sulphate concentration of 18 g./litre was used in one instance to simulate roughly the maximum likely to be used in stripping. The other acids received less attention than sulphuric acid, but treatments were selected with the object firstly of comparing their action with that of sulphuric acid and secondly of comparing their action at pH values at which they are normally used. The alkali solubility was used as the index of the degree of modification of the wool whenever possible, but this method is insufficiently sensitive for wool treated with weak acids. For these samples the urea-bisulphite solubility was used, but it should be borne in mind that this test is used mainly to indicate alkaline modification, which is shown by a decrease in solubility below that of the scoured yarn; used in this way, the test is indicative of the formation of stable cross-links and probably also of denaturation.

Although the wool was deionised as far as possible by circulating through it water in contact with Bio-deminolit (Permutit Co. Ltd.) ion-exchange resins before the "no salt" treatments, the boiling treatments at pH values below 3 would be expected to produce small amounts of ammonium salts by amide hydrolysis; the results under the heading "no salt" should therefore be judged with this reservation.

#### DISCUSSION

For brevity in the following, the temperature of pH measurement is written as a suffix; e.g. pH<sub>20</sub> indicates measurement at 20°C.

The results show that the boiling sulphuric acid solution at pH<sub>20</sub> 2.4 in the absence of salt causes more modification than do the other acids under corresponding conditions. The addition of the salt with the common ion to solutions of hydrochloric, oxalic, and phosphoric acids causes an increase in the effect on the wool, this effect being evident at pH values measured both at room temperature and at 100°C. On the other hand, the presence of sodium sulphate in sulphuric acid solutions more acid than pH<sub>20</sub> 3 results in a decrease in the alkali solubility and therefore in an apparent protective effect on wool. Some results of Bauer<sup>11</sup> showing the loss in weight of wool by boiling in sodium sulphate-sulphuric acid solutions of varying salt but initially constant acid content lend support to the above results. Comparison between the columns showing pH values at 20° and 100°C. suggests that the rise in the pH value of the sodium sulphate-sulphuric acid solutions with rise of temperature more than compensates for the effect on wool due to increased concentration of

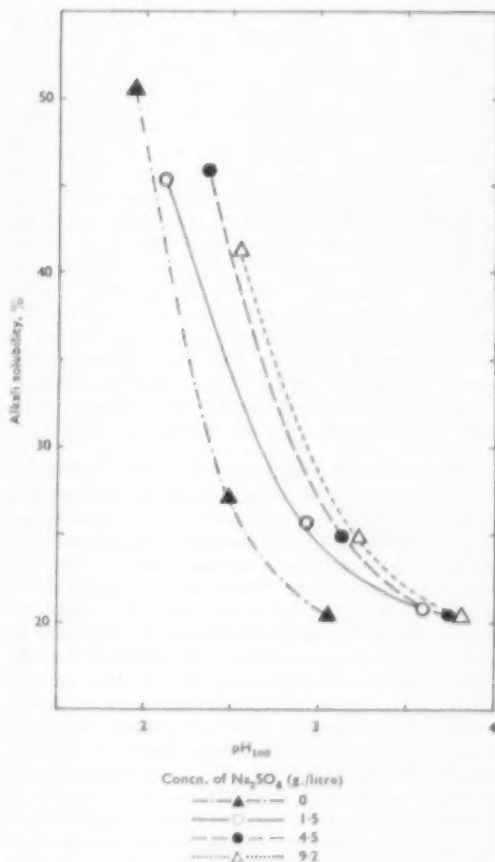


FIG. 1.—Effect of Sodium Sulphate-Sulphuric Acid Solutions at the Boil on Alkali Solubility



salt; when the pH shift is taken into account, however, it is clear that the attack on the wool increases with increasing salt concentration, as is shown in Fig. 1, where alkali solubility is plotted against pH at 100°C. for each salt concentration. A similarity to the curves of Steinhardt *et al.*<sup>1</sup> is obvious.

Phosphoric acid-sodium phosphate solutions also show a pH shift similar to that of the sulphate solutions but of about half the magnitude. Evidently, in terms of alkali solubility, which with the phosphate increases with increasing salt concentration and with fall in pH<sub>20</sub>, the pH shift in this case is insufficient to compensate for the Donnan membrane effect of the salt. Moreover, when comparison is made at pH<sub>100</sub> with corresponding pH values shown in Fig. 1 and at corresponding salt concentration, the effect on the alkali solubility is approximately the same.

Comparison of the effect of the acids alone shows that those having univalent ions (hydrochloric, phosphoric, and formic) exert a similar effect on alkali solubility, whilst those containing a proportion of bivalent ions, such as sulphuric and oxalic acids, are more active.

#### *Levelling Action of the pH Shift*

Arising out of the pH shift due to rise in temperature of sodium sulphate-sulphuric acid solutions, and to a lesser extent of the other solutions showing pH shift, a point of practical interest to dyers emerges from a comparison of pH<sub>20</sub> values of the solutions used in equilibrating the wool at 30°C. with those of the solutions at the boil. Experience showed that the wool needed prior equilibration with the sulphate solutions at up to 0.3 pH unit higher than the value desired for the boiling treatment. If this precaution were not taken, the effusion of acid from the wool at the boil would have produced pH values lower than required. Obviously, the use of "shorter" liquor ratios would have caused larger increases in the acid content of the boiling liquor. One factor in the levelling of dyes in acid liquors during the process of bringing to the boil is thus the effusion of acid from the wool. Conversely, cooling of the same liquor should have an unlevelling tendency.

#### *Excess Sodium Sulphate in Practical Dyeing*

In practical dyeing with acid levelling dyes the degree of exhaustion obtained will largely depend upon the acid content of the wool and the sodium sulphate concentration of the liquor. Dyeing recipes are chosen for their ease in giving satisfactory dyeing, but if more than the necessary amount of sodium sulphate is used, as can occur in short liquors, more acid will be required for the desired degree of exhaustion of dye and so will increase the degree of acid attack in spite of the "apparent" protective effect of sodium sulphate. Interpolation of the results in Table I suggests that the pH values, measured at room temperature, at which significant increases in acid attack in practical dyeing are likely to occur will be below 2.6. At pH values above about 2.6, obtainable with low percentages of sulphuric acid but preferably with formic or acetic acid, there appears

little reason, as far as acid damage in the practical dyeing of virgin wool is concerned, for taking care over pH or content of Glauber's salt unless boiling is unduly prolonged. Only below about pH 2.6 does it appear desirable, in order to conserve the wool in dyeing, to make sparing use of Glauber's salt; but with the corresponding stripping process in which Glauber's salt is added to the acidic dye liquor liberal use can be made of the salt, because extra acid is not also added.

#### *Use of Sodium Sulphate with Weak Acids*

Evidence that in the presence of weak acids such as formic or acetic the temperature-dependent pH shift due to sulphate ions is still operative (though in smaller degree because of the pseudo-buffering action of the weak acid) is given in the section relating to sodium sulphate with weak acids in Table I. As in the instance of the sodium sulphate-sulphuric acid solutions, the pH shift would be expected to contribute to levelling during the stage of bringing to the boil. The resemblance to the sodium sulphate-sulphuric acid solutions is even closer when the solution within the fibres is considered. Here, by means of ion exchange, the relatively high concentration of sulphate ions in the external solution favours the exclusion of the weak-acid anions from the fibre; and the undissociated acid would not be expected to be absorbed from the very dilute solution. Thus the use of these solutions offers a means of exploiting the pH shift of sulphates along with the pseudo-buffering function of the weak acids.

#### *Treatments giving Minimum Modification*

Boiling for 90 min. in the pH<sub>20</sub> 3.34 sodium sulphate-formic acid solutions produced about the least modification so far found possible with boiling for this time, but no doubt this result could be achieved with other proportions of acid and salt. The wool under these conditions was relatively insensitive to duration of boil. Further experiments are necessary in order to establish more precisely the conditions for minimum modification.

#### *Effect of Duration of Boil*

The few treatments that were prolonged up to 6 hr. show that—(a) except for boiling times of less than 45 min. the attack by sulphuric acid increases linearly with time; (b) formic acid with sodium sulphate (1.5 g./litre) at pH<sub>20</sub> 3.34 causes a very slow rate of acid attack; (c) acetic acid with sodium sulphate (1.5 g./litre) at pH<sub>20</sub> 4.51 causes a slow rate of decrease in urea-bisulphite solubility, indicating a slow rate of disulphide bond breakdown.

\* \* \*

The author desires to thank Dr. F. F. Elsworth for advice and for reading the manuscript. The technical assistance of Mr. R. F. Pickup is gratefully acknowledged.

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(Received 19th March 1957)

## References

- <sup>1</sup> Steinhardt, Fugitt, and Harris, *Bur. Stand. J. Res.*, **25**, 519 (1940); **28**, 201 (1942); **30**, 123 (1943).
- <sup>2</sup> Elöd, Nowotny, and Zahn, *Melliand Textilber.*, **23**, 577 (1942); *Kolloid-Z.*, **100**, 297 (1942).
- <sup>3</sup> Dusenbury, Mercer, and Wakelin, *Text. Research J.*, **24**, 890 (1954).
- <sup>4</sup> Schönplüg, *Textil Praxis*, **10**, 490 (1955).
- <sup>5</sup> Würz, *Melliand Textilber.*, **36**, 589, 810, 931 (1955).
- <sup>6</sup> Peryman, *J.S.D.C.*, **70**, 83 (1954).
- <sup>7</sup> Idem, *Proc. International Wool Textile Research Conf. Australia*, **E**, E 17 (1955).
- <sup>8</sup> Bates, *Electrometric pH Determinations* (New York: Wiley & Sons Inc. 1954), p. 86.
- <sup>9</sup> Harris and Smith, *Bur. Stand. J. Res.*, **17**, 577 (1936).
- <sup>10</sup> Lees and Elsworth, *Proc. International Wool Textile Research Conf. Australia*, **C**, C 363 (1955).
- <sup>11</sup> Bauer, *Amer. Dyestuff Rep.*, **54**, 253 (1956).

## Errors in the Assessment of Colour Fastness

ULF BÜLOW and STURE HORRÉDIN

The different sources of variation in assessing fastness, especially light fastness, are discussed. By a variance component analysis the total variance and its components—the process variation, the testing variation, and the assessment variation—have been estimated for eight different dyeings on a cotton fabric. The assessment variation is found to be considerable, depending both on differences with one and the same observer (time factor) and on differences between different observers (observer factor). The possibility of obtaining a truer estimate of fastness is briefly discussed.

The testing of the fastness properties of dyed textile fabrics is becoming more common every day. A growing concern for quality by consumers, retailers, and garment makers is followed by an attempt by the textile manufacturers and dyers to produce even better dyeings, and an important part of this effort is the testing of colour fastness.

Fastness testing does not differ in principle from other forms of physical or chemical testing. The result, i.e. the fastness grading, is, like all other measured quantities, subject to variations, depending partly on the inhomogeneity of the material, and partly on the uncertainty of the test. If it is stated that the tensile strength of a piece of cloth is 60 lb./in., this information is of little value if we do not know the uncertainty of this figure. This uncertainty might be expressed by means of the standard deviation. In the same way, to say that a certain dyed cloth has a light fastness of 5 is valueless if we do not know the uncertainty. We even risk, if the uncertainty is great, making false assessments of the properties of the cloth.

The first source of variation is the actual variation of the material due to differences in dyeing, rinsing, aftertreatment, finishing, etc. from batch to batch (variations may, of course, occur also within the same batch). These sources together might be called the process variation or "dyeing factor".

There is also a variation in the testing procedure itself. In testing washing fastness, temperature, composition of wash liquor, rate of stirring, liquor ratio, etc. may vary; in testing light fastness (fading lamp), the intensity of the radiation or the humidity and temperature of the air may change somewhat from time to time. Standardisation of test methods helps to minimise such variations, but nevertheless some testing variation does remain.

Finally, there is a source of variation in the assessment of the results. All assessments of fastness are made by visual comparison of two areas of cloth to determine any difference in colour between them, the magnitude of this difference being estimated by comparison with a fixed standard, i.e. the grey scale.

In the case of light fastness the colour difference must be great enough to allow an assessment of the fastness. The magnitude of this colour difference is differently and somewhat vaguely defined in the I.S.O. and Swedish standard methods. According to the proposed I.S.O. method for testing fastness to daylight, an assessment should be based on three different contrasts—(1) when a change can "just be perceived", (2) Grey Scale Grade 4, and (3) Grey Scale Grade 3. According to the Swedish standard<sup>2</sup>, the contrast should be "obvious". In the present investigation the Swedish standard method has been followed, but the conclusions drawn should be valid also for other methods.

The assessment of light fastness is affected by several variations—(a) between different observers, (b) between the observations made by one observer at different times, and (c) in illumination. Different persons have different opinions about what is meant by slight, obvious, and great differences (changes) in colour. Some people lay the greater stress on hue, others on depth. This fact is important, because a dye often changes its hue as much as its depth. Experience plays a large part in assessing and interpreting these facts. Some people tend, consciously or unconsciously, to neglect a colour change that is considered of less importance for the consumer.

Assessments can vary also according to a person's physical fitness, so that allowance must be made for this. If a number of patterns are assessed within a relatively short time, e.g. 15 min., the mutual order of these patterns will be more accurately estimated than if they are assessed at different times, e.g. with several weeks between the assessments. If the result of an earlier test is available for comparison, judgment is easier than if a new assessment must be made without any record of the earlier one. It is true that use of the grey scale reduces this disadvantage to insignificance for greys and blues, but yellows and reds cannot be assessed so precisely. When a large number of patterns, e.g. twenty or more, are assessed at the same time, it can be presumed that the assessments will not be equally accurate for

the first and the last patterns; the observer may "train" himself in the course of judging, or he may become fatigued, depending upon the individual.

Another difficulty is the fact that blacks, browns, and blues are more easily assessed than yellows and reds, as the grey scale corresponds quite well to the former, but not to yellows and reds. In the latter case one must face the difficulty of "translating" e.g. a yellow colour change into the corresponding grey colour change.

A colour difference can depend also on the type of lighting. Therefore it is important to provide for suitable and constant conditions of illumination. In practice, however, this is often difficult to arrange.

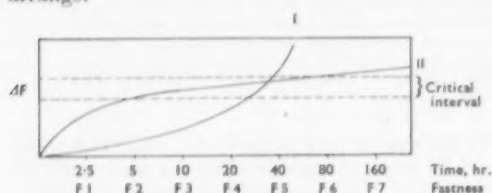


FIG. 1.—Effect of Duration of Exposure on Assessment of Light Fastness

As far as light fastness is concerned, the uncertainty is different for different dyes, depending on how the dye is affected by light, as will become clear from Fig. 1. If the colour change after fading is  $\Delta F$ , it is obvious that  $\Delta F$  increases with the time of exposure. There is also a critical value, or better a critical interval, for  $\Delta F$ , below which one will not find the colour difference obvious, and above which a colour difference is quite evident. Within this critical interval one is doubtful, and the statement "obvious" or "not obvious" will be uncertain. Dye I passes through this critical interval rapidly. After 20 hr. exposure the colour difference is "not obvious", and after 40 hr. it is quite obvious. Thus the light fastness will be assessed at 5 with great accuracy. Dye II after only 5 hr. exposure has undergone a change that may be regarded as "obvious", but not until after about 80 hr. has the curve left the critical zone, so that the colour difference can definitely be regarded as "obvious". In this case the light fastness is very uncertainly estimated at 5, and it might be anything between 2 and 6. These two examples might be regarded as extremes, yet they illustrate a fundamental difficulty in the assessment of light fastness.

The variations discussed above will be termed *assessment variations*.

Thus the components of variation might be summarised as—(1) process variation, (2) testing variation, and (3) assessment variation.

It is the process variation ("dyeing factor") alone that shows the variation of the real properties of the cloth. In the fastness values obtained, however, this is entangled with two factors irrelevant to the actual quality, viz. the testing and assessment variations. The causes of the testing variation have been indicated briefly above. So far, very little is known about the assessment variation, and it is generally neglected.

As will be shown in the following, however, it is of fundamental importance.

In order to estimate the different components of variation in the testing of light fastness, a complete factor experiment with each of eight colourings was made with the following factors, and number of levels for each factor—

Times (repeats) <i>R</i> ...	...	2
Observers <i>O</i> ...	...	5
Dyeings (batches) <i>D</i> ...	...	2-9
Tests <i>T</i> ...	...	3

The time factor indicates the variation between assessments made on the same specimen of fabric, by the same observer, at different times; the observer factor indicates differences between observers; the dyeing factor indicates differences between dyeing batches; and the testing factor indicates differences of the fading lamp at different times.

Eight colourings were tested—

	No. of Patterns
I Navy blue	9
II Black	5
III Medium blue	8
IV Pastel blue	5
V Pastel grey-blue	4
VI Pink	2
VII Red	5
VIII Turquoise	3

All colourings were dyed on plain-weave cotton cloth and afterwards finished with melamine resin.

The tests were carried out in a Fade-Ometer FDA-R, according to Swedish Standard SIS 650013<sup>2</sup>. Tests and assessments were made after randomising. The assessments were made in northern sky light on a clear day at about the same time of the day but in different rooms. The time interval between the two assessments of each observer was about two weeks. The components of variance were then calculated by a variance component analysis<sup>3</sup>. For the mathematical treatment of the assessments a fastness intermediate between two grades was denoted thus: 3-4 = 3.5; 4-5 = 4.5, etc.

### Results

The results of the light-fastness assessments are given in Table I, and of the analysis of the variance in Table II.

TABLE I  
Light-fastness Assessments

Colouring	Light Fastness		Variance (total)	Standard Deviation (total)
	Mean	Grading		
I	4.54	4-5	0.53	0.73
II	4.77	5	0.50	0.71
III	3.25	3-4	0.28	0.53
IV	2.74	2-3	0.25	0.50
V	5.95	6	0.54	0.73
VI	2.48	2-3	0.50	0.77
VII	3.09	3	0.53	0.73
VIII	2.68	2-3	0.28	0.53

If the fastness values follow the normal distribution (Gaussian curve), about 95% of all values

TABLE II  
Estimates of the Variance Components

Colouring	...	I	II	III	IV	V	VI	VII	VIII
<i>R</i>	...	0.16	0.21	0.15	0.19	0.17	0.24	0.12	0.12
<i>O</i>	...	0.07	0.19	0.02	0.03	0.26	0.31	0.30	—†
<i>D</i>	...	0.22	0.04	0.01	—	0.10	—	0.05	—
<i>T</i>	...	0.01	—†	—	0.02	0.01	0.04	—	—
<i>O</i> × <i>D</i> *	...	0.02	—	—	—	—	—	—	—
<i>O</i> × <i>T</i> *	...	0.03	0.06	0.08	—	—	—	0.06	0.08
<i>D</i> × <i>T</i> *	...	0.02	—	0.02	—	—	—	—	0.08
Total	...	0.53	0.50	0.28	0.25	0.54	0.59	0.53	0.28

\* Interaction factors

† Dashes (—) indicate components of variance which are not significant

should lie within the limits  $\bar{x} \pm 2s$ , where  $\bar{x}$  = mean and  $s$  = standard deviation. An examination of the results shows that the distribution fulfils this condition quite well. This, however, does not necessarily mean that the distribution is normal Gaussian.

For colouring I the total variance is 0.53. The corresponding standard deviation  $s = \sqrt{0.53} = 0.73$ . This means that, on repeating the tests, when the factors *O*, *D*, and *T* are randomly chosen, about 95% of the fastness values will come within  $\bar{x} \pm 2s$ , i.e.  $4.54 \pm 1.46$ , or between 3 and 6. Thus there are confidence limits of about  $\pm 1.5$  units if one sample, one test, and one assessment are taken to represent the fastness of all dyeing batches of this colouring.

If we reduce our claims and ask what the light fastness is of one particular sample, we will be less uncertain. The component *D* of the variance, the dyeing factor, is then eliminated, and the variance becomes 0.27 (the interaction factors *O* × *D* and *T* × *D* also are eliminated), so that  $s = 0.52$  and  $2s = 1$  unit.

If we reduce our claims to universality one step further, and ask how one person, randomly selected, will assess one sample of a colouring at different times, we further decrease the uncertainty, this time by the *O* component or observer factor. This means that only the time factor and the test factor are left, which in this case give  $0.16 \pm 0.01 = 0.17$ , so that  $s = 0.41$  and  $2s = 0.8$ . The fastness value becomes more precise, but always at the cost of the universality of the result.

## TIME FACTOR

The mean of the time factors *R* for the eight colourings is 0.17. The value of *R* varies somewhat among different observers (Table III and Fig. 2).

TABLE III  
Observer Time Factor *R*

Observer	Time Factor <i>R</i>
P 1	0.12
P 2	0.13
P 3	0.18
P 4	0.25
P 5	0.17
Mean	0.17

The Swedish Institute of Textile Research in Gothenburg (TEFO) has carried out assessments on one of the three series with the results shown in Table IV for four observers.

TABLE IV  
Observer Time Factor *R*

Observer	Time Factor <i>R</i>
P 6	0.17
P 7	0.11
P 8	0.26
P 9	0.18
Mean	0.18

The agreement between the two means is good. The time factor expresses the smallest possible uncertainty of a fastness test. It may, however, be reduced by training or other measures. The time factor seems to lie between 0.1 and 0.2 for different observers, and the confidence limits  $\pm 2s = \pm 0.6-0.9$  unit. When a person makes an assessment, we may therefore expect a precision of 0.5-1.0 unit. This does not mean, however, that the observer will keep within these limits in relation to the "true" value of the light fastness, only that he is capable of reproducing his assessment with this precision. If we wish to express the uncertainty of the true value assessed by an

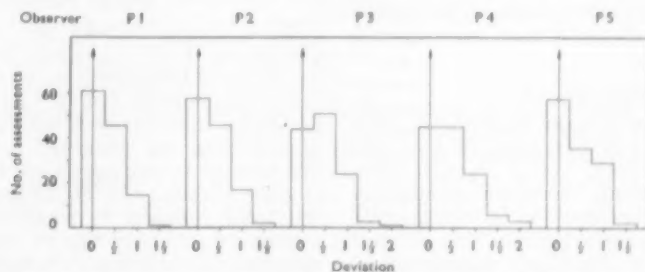


FIG. 2.—Deviations between First and Second Assessments for Different Observers



observer, the observer factor and the test factor must be included in the variance.

The time factor includes also the variation depending on differences in illumination when assessments are made. The assessments were, however, carried out as far as possible under the same conditions (northern sky light), and the lighting variations were small. That no important contribution to the variance is made by the lighting conditions is supported by the fact that the time factor found by TEFO is of the same magnitude as the one found by the authors, despite the constant illumination (daylight lamp) used by TEFO.

#### OBSERVER FACTOR

The observer factor seems to vary considerably with the colour (Table V), owing to the fact that some colours are "easy" to assess (p. 460), while others are more difficult.

Colouring	Variance	Standard Deviation
I	0.07	0.26
II	0.19	0.44
III	0.02	0.14
IV	0.03	0.17
V	0.26	0.51
VI	0.31	0.56
VII	0.30	0.55
VIII	—	0
Average	0.33	

In 1952 K. McLaren<sup>4</sup> found an average standard deviation of 0.52 unit by assessing, by means of the grey scale, patterns showing mainly changes in hue.

It is impossible to eliminate the observer factor in estimating the "true" value, e.g. by always employing the same observer, because there is no objective method of deciding which one of several normal persons judges most "correctly". The instructions for light-fastness assessment require the observer to decide whether a given colour change is "perceptible" or not. "Perceptible", being a subjective concept, is beyond all dispute. With colourings V–VII the observer factor dominates the total variance, while for III, IV, and VIII this factor is negligible. It may thus be impossible to predict whether an observer factor is appreciable or not.

Fig. 3 shows how the assessments of the various observers deviate from the median value of each dyeing batch.

#### DYEING FACTOR

The dyeing factor includes everything which may influence the real properties of the dyed cloth, e.g. pretreatment, actual dyeing, after-treatment, and finishing. It varies considerably from colouring to colouring. It is obvious that some colourings are easy to produce with constant light fastness (III, IV, VI, VIII), whereas others are extremely variable in this respect (e.g. I).

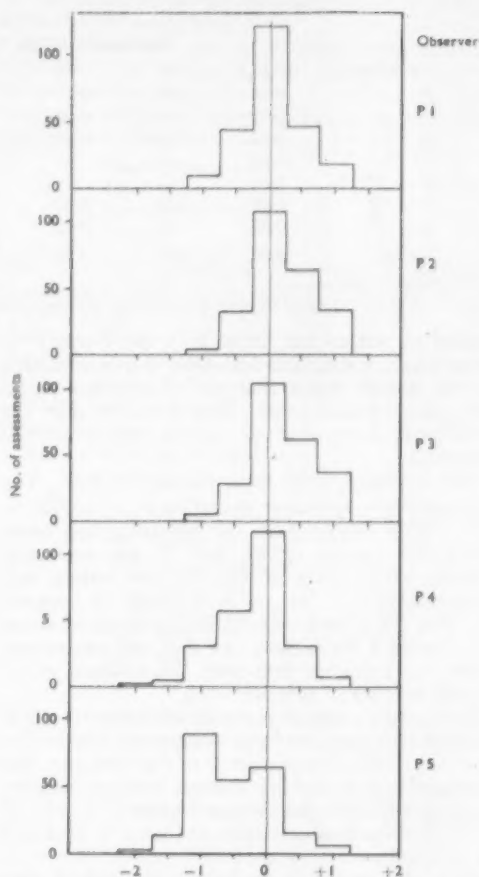


FIG. 3.—Deviations from the Medians for Each Dyeing Batch

The dyeing factor, like the observer factor, is impossible to predict for an unknown colouring.

#### TESTING FACTOR

The testing factor is generally very small, which indicates that the fading lamp has been operating under constant conditions.

#### INTERACTION FACTORS

The interaction factors, which express the lack of constancy of one of the factors at the different levels of the other, are generally small compared with the main effects.

#### OTHER FACTORS

When dyeings of very high or very low light fastness, viz. 1 or 8 or gradings close to these values, are tested, other conditions of variation exist than those encountered with I–VIII. Both the time factor and the observer factor will be considerably smaller than for fastnesses between 2 and 7. Whether the testing and dyeing factors are smaller is more doubtful. In all circumstances, however, the total variation is comparatively small for dyeings of extremely high or extremely low light fastness. This also applies to fading agencies other than light.



## SUMMARY OF LIGHT-FASTNESS VARIATION

The variance of the light fastness of a number of different dyeings has been found to be composed of the following main components—

Time factor	...	0-17
Observer factor	...	0-0-30
Dyeing factor	...	0-0-20
Total variance		0-2-0-7
Confidence limits		$\pm 0-9-1-7$ or $1-1\frac{1}{2}$

## Variation of Washing Fastness

A similar investigation was made on washing fastness at 60°C. tested according to the I.S.O. recommended method<sup>5</sup>. The results are given in Table VI.

TABLE VI  
Washing Fastness<sup>5</sup>

Colouring	Fastness	
	Staining of Cotton	Colour Change
I	2-52 (2-3)	4-83 (5)
II	3-43 (3-4)	5-00 (5)
III	2-38 (2-3)	4-80 (5)
IV	3-37 (3-4)	4-97 (5)
V	4-85 (5)	4-77 (5)
VI	3-29 (3-4)	5-00 (5)
VII	2-88 (3)	4-92 (5)
VIII	2-89 (3)	4-75 (5)

For staining the following components of variation were found—

Time factor	...	0-05
Observer factor	...	0-0-12
Dyeing factor	...	0-0-30
Testing factor	...	0-0-05
Total variance	...	0-05-0-50
Confidence limits	...	$\pm 0-4-1-4$ or $\frac{1}{2}-1\frac{1}{2}$

For colour change they were—

Time factor	...	0-03
Observer factor	...	0-0-07
Dyeing factor	...	0-0-14
Testing factor	...	Insignificant
Total variance	...	0-03-0-24
Confidence limits	...	$\pm 0-3-1-0$ or $\frac{1}{2}-1$

The total variance for colour change is smaller than that for staining, because all dyeings had a fastness of 5 or near 5. As previously stated, the components of variation at such extreme values are small, and the dyeings examined must not be regarded as typical of the variation found with colour change. It can be assumed, however, that for the same fastness grading the total variance is of the same magnitude for colour change as for staining.

## Conclusion

In fastness testing the testing and assessment variations together are greater than the dyeing variation, at least as far as light fastness is concerned. Of these two variation factors, that of the

assessment is by far the most important. This in turn is composed of two factors—the time factor and the observer factor.

The dyeing variations found must not be generalised but are valid only for the eight colourings tested. The resin treatment, for instance, may have affected the dyeing factors considerably. The testing and assessment variations, however, are considered to be valid for all tests of light fastness and washing fastness.

Confidence limits are given in Table VII.

TABLE VII  
Confidence Limits ( $\pm 2s$  grades)

	Process Variation (Dyeing Factor)	Total Variation
Light fastness	$\pm 0-0-0$	$\pm 0-9-1-7$
Washing fastness, colour change	$\pm 0-0-7$	$\pm 0-3-1-0$
Washing fastness, staining	$\pm 0-1-1$	$\pm 0-4-1-4$

## HOW TO OBTAIN A TRUER ESTIMATE OF FASTNESS

To be able to decrease the variation one must know its component parts and their magnitudes. This is usually not the case; e.g. the dyeing factor depends largely on the dyeing.

The best way to reduce a variation factor and obtain a more correct determination of the true mean is to take several samples (replicates). Let us see how this will influence the total variance  $s^2$ —

$$s^2 = s_R^2 + s_O^2 + s_T^2 + s_D^2$$

where  $s_R^2$  = time factor;  $s_O^2$  = observer factor;  $s_T^2$  = testing factor; and  $s_D^2$  = dyeing factor. If we now suppose that  $n$  assessments are made by one person on one sample, we shall have, as  $s_T^2$  is negligible—

$$s^2 = \frac{s_R^2}{n} + s_O^2 + s_D^2$$

The time factor has been reduced by the factor  $n$ , but the other components of the variance remain unchanged. Such an assessment procedure, furthermore, will be very tedious, since a certain time, preferably two weeks, must elapse between the assessments in order that the observer will have no recollection of an earlier assessment, which would influence him, consciously or unconsciously. If a reduction of the other variation factors is wanted, several persons must take part in the assessments, and several samples from different dyeing batches must be tested. Such a testing procedure is unrealistic. We are therefore forced to the conclusion that, as long as the assessment of fastness is made subjectively, i.e. by visual examination by an observer, the fastness gradings must remain what they are, viz. to a great extent subjective ratings of certain properties of a dyeing.

The uncertainty of a fastness grading, because of this subjective factor, is greater than is generally realised. Particular attention ought to be paid to this fact when the labelling of textile fabrics with their colour fastness is discussed.

The authors wish to express their gratitude to the Swedish Institute for Textile Research and the head of its testing department, Hr. A. Bernskiöld, for their kind cooperation.

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(Received 18th February 1957)

### References

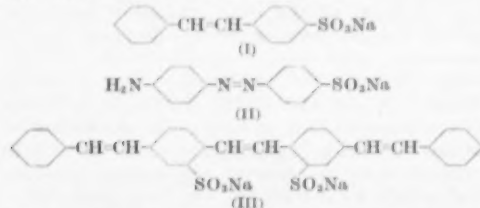
- <sup>1</sup> Society of Dyers and Colourists, *Standard Methods for the Assessment of the Colour Fastness of Textiles* (Bradford 1955), p. 24.
- <sup>2</sup> Swedish Standard S18 650013.
- <sup>3</sup> Hicks, Charles R., *Industrial Quality Control*, 13, (3), 5 (Sept. 1956);  
Davies, O. L., *Statistical Methods in Research and Production* (Edinburgh: Oliver & Boyd, 2nd edition 1949).
- <sup>4</sup> McLaren, K., *J.S.D.C.*, 68, 205 (1952).
- <sup>5</sup> Society of Dyers and Colourists, *op. cit.*, p. 63.

## CORRESPONDENCE

*The Editor does not hold himself responsible for opinions expressed by correspondents*

### Dyeing Theory again

Sufficient time has now elapsed since the publication in 1955 of the first Explanatory Papers on Modern Theory to enable the reader to make up his mind whether or not a nodding acquaintance with  $\Delta\mu^\circ$  and  $\Delta H^\circ$  is a useful adjunct to "common sense and common salt". However, it was unfortunate that these papers should have appeared just when dyeing theory "after a period of neatness and logic, had gone fluid again". This remark applied particularly to the theory involving the spacing of hydrogen-bond-forming groups in dyes which are substantive on cellulose, a theory which has received considerable criticism ever since it was first published. Initially the criticism was levelled against the 10.8 Å.-10.3 Å. aspect of the theory; but more recently it has been directed against the application of hydrogen bonding, it being argued that the hydroxyl groups of cellulose are too firmly solvated by water to enter into hydrogen bond formation with dyes. Evidence of substantivity in aromatic sulphonic acids not containing hydrogen-bond-forming substituent groups, and also of the high substantivity of certain carbocyclic vat dyes, is taken as an indication that the bonding between dye and cellulose must be of the non-polar van der Waals type. According to this theory, conjugation and resonance in the dye molecule are of importance merely because the resulting flat molecular configuration allows a sufficiently close approach for the non-polar forces to become operative; also the approximate correlation between molecular weight and substantivity is in keeping with the fact that non-polar van der Waals (dispersion) forces are additive over all the atoms of a molecule.



Somewhat similar experimental evidence has been obtained here, where Mr. C. D. Ward has been investigating the substantivity of model substances on cellulose and has shown, for example, that I has a slightly greater affinity than II. Interest now centres around compounds of type

III, where the typical linear conjugated structure of the direct dye is maintained, but the normal hydrogen-bond-forming groups are eliminated. However, we do not consider that this type of evidence is a proof that the bonding is exclusively of the non-polar type, for an alternative explanation appears to us to be possible, namely, interaction between the  $\pi$  electrons of the extended conjugated system and the hydrogen atoms of the hydroxyl group in cellulose. This would be in keeping with the fact that the substantivity for cellulose can be more closely related with the number of such electrons than with the molecular weight (see Peters and Sumner<sup>1</sup>, Table II and Fig. 2).

Spectroscopic and other evidence of this type of interaction has been put forward by Jones and Badger<sup>2</sup>, Mecke<sup>3</sup>, Bohn<sup>4</sup>, and others, and the possible significance of this type of bonding to cellulose has been referred to by Bamford<sup>5</sup>. Bond strengths of the order of 3-4 kcal./mole have been estimated in the case of benzene and homologues, as compared with 5-7 kcal./mole for the more usual types of hydrogen bonding, but the actual figure depends on the extent of conjugation and the nature of the substituent groups. The linkage could be described as a weak hydrogen bond of a type somewhat different from those described by Vickerstaff<sup>6</sup>.

A further point of interest arises with this type of bonding. If the electrons with which interaction takes place are "non-localised", the adsorbed dye will have a greater degree of freedom than when the normal type of hydrogen bonding occurs. Consequently, the entropy of the system will be higher, and this in turn will favour substantivity, since the affinity depends not merely on the strength of the bonds formed (and broken) during dyeing, but also on the entropy changes which occur simultaneously.

As Vickerstaff<sup>6</sup> says, "the investigation of entropy changes in dyeing is still in a very elementary stage and it may be that far reaching conclusions can be arrived at by further study".

W. L. LEAD

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE  
21st July 1957

- <sup>1</sup> Peters, R. H., and Sumner, *J.S.D.C.*, 71, 130 (1955).
- <sup>2</sup> Jones and Badger, *J. Amer. Chem. Soc.*, 73, 3132 (1951).
- <sup>3</sup> Mecke, *Faraday Soc. Discussions*, (9), 161 (1950).
- <sup>4</sup> Bohn, *J. Amer. Chem. Soc.*, 73, 1571 (1951).
- <sup>5</sup> Bamford, *Faraday Soc. Discussions*, (16), 230 (1954).
- <sup>6</sup> Vickerstaff, *The Physical Chemistry of Dyeing* (London: Oliver & Boyd, 2nd edition 1954) pp. 119, 181.



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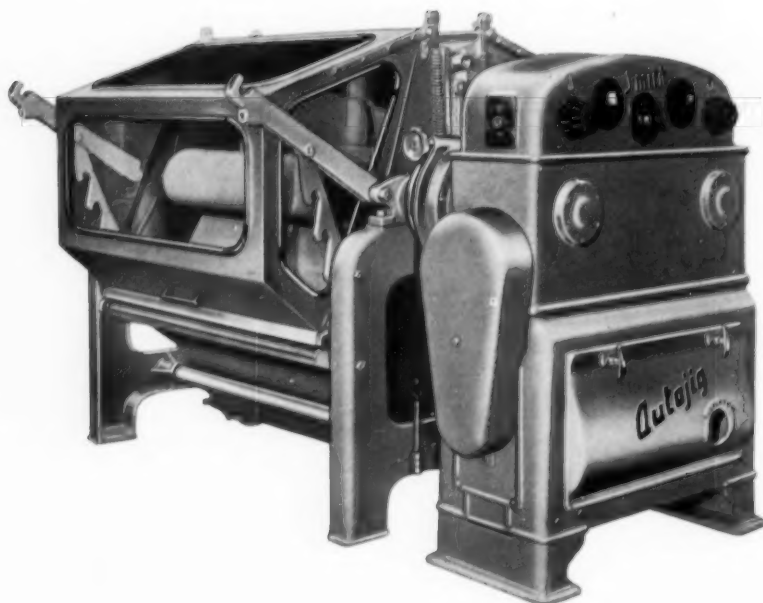
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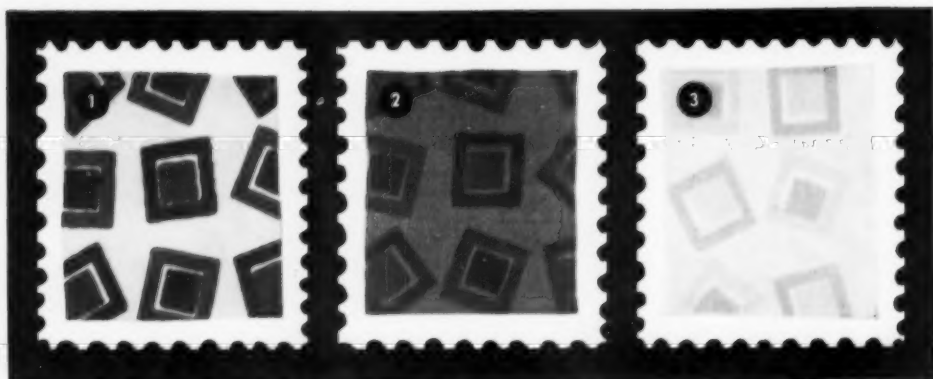
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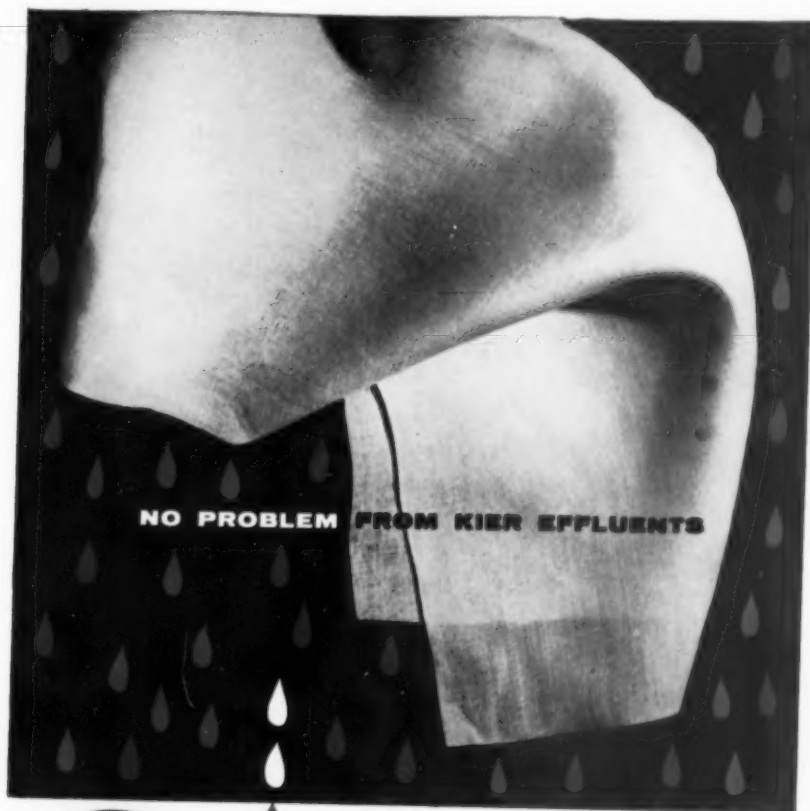
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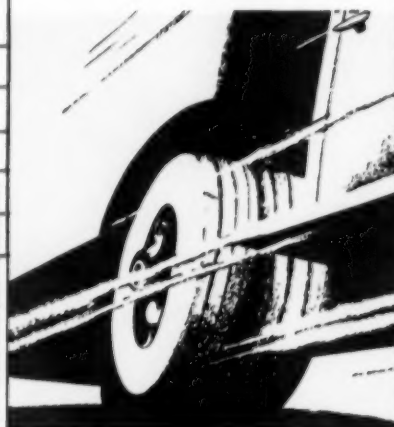
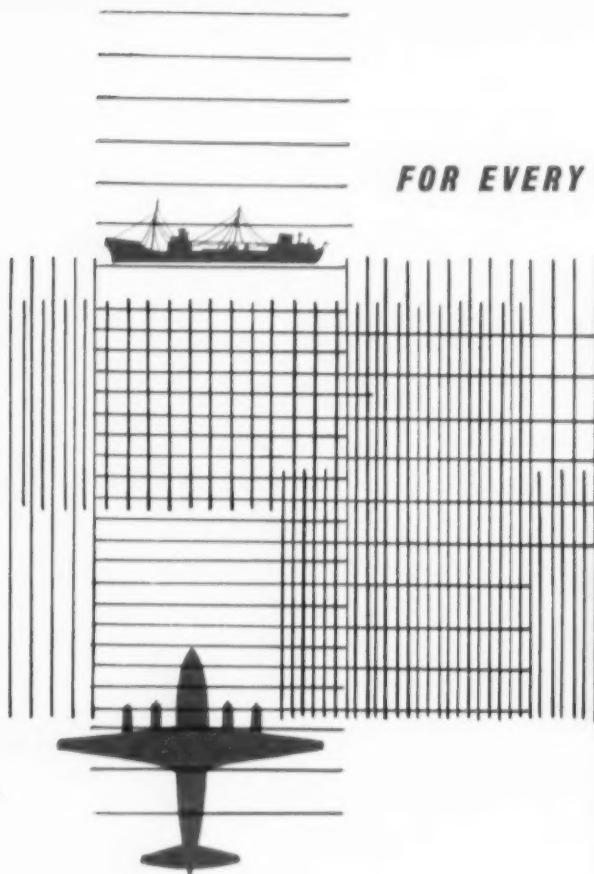
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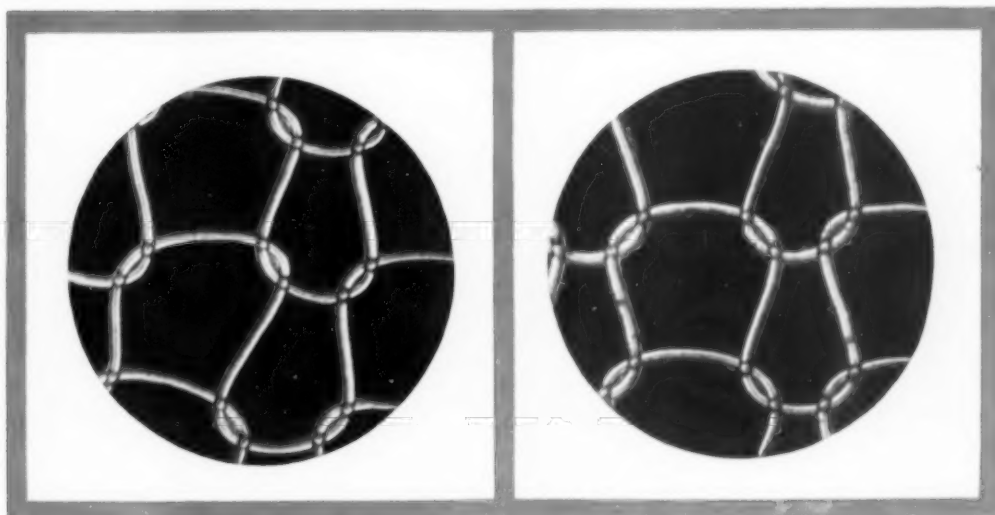
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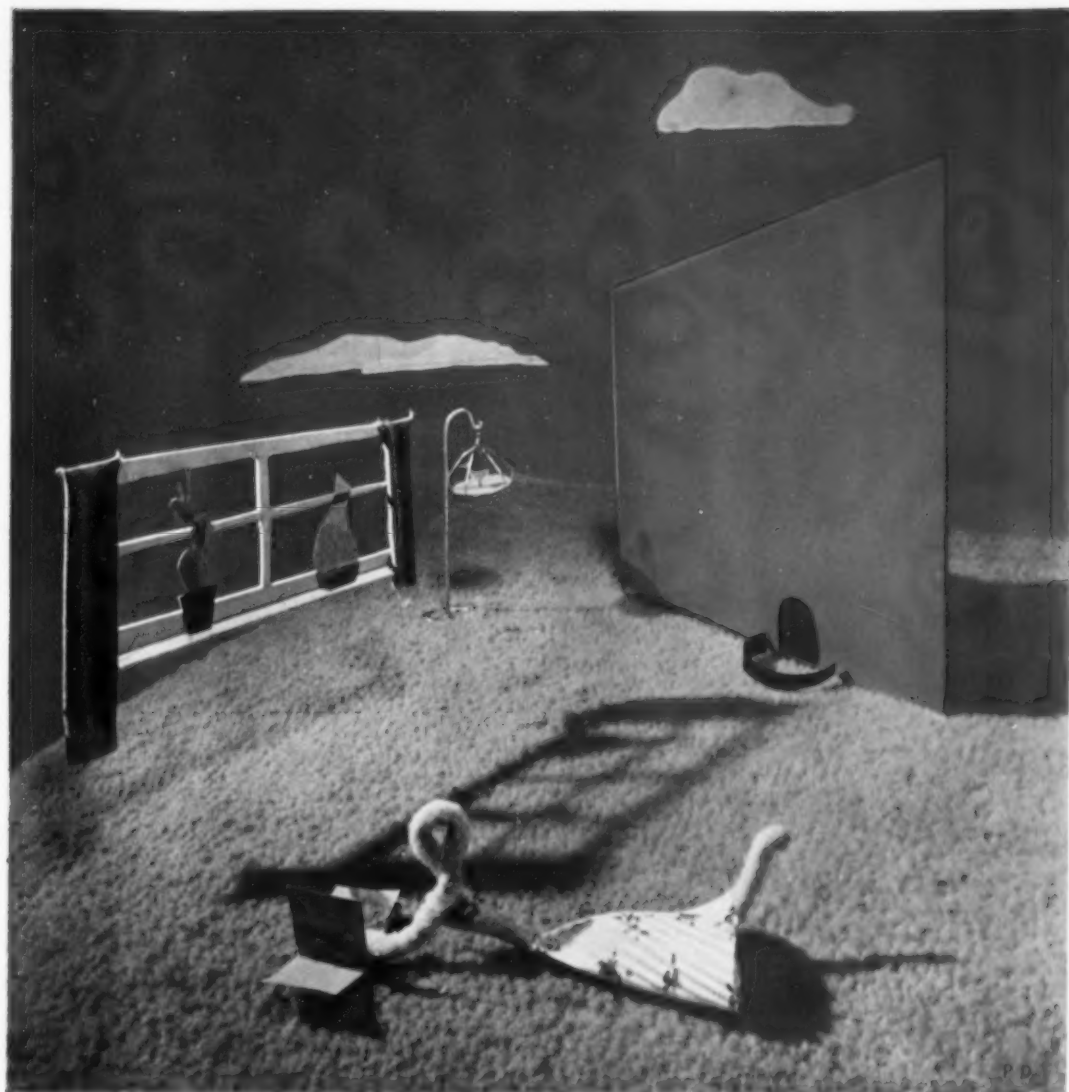
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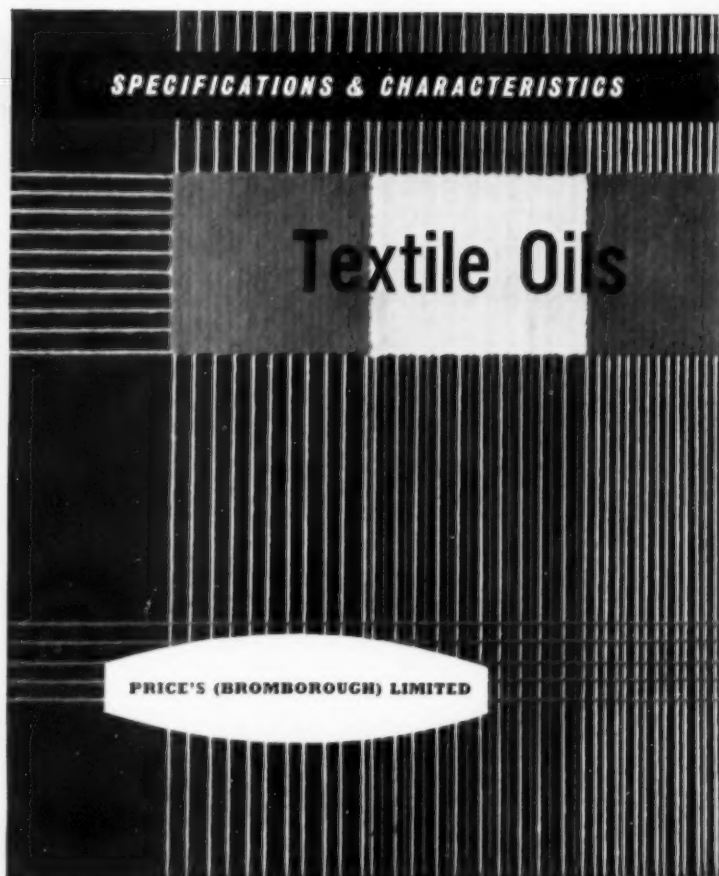
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## Notes

### Meetings of Council and Committees September

Council—18th  
Publications—12th  
Colour Index Editorial Panel—13th  
Review of Textile Progress—27th

#### Election of Associates

At the meeting of Council held on 18th September 1957 the following were elected Associates of the Society—

#### BRANCH 1—TINCTORIAL TECHNOLOGY AS APPLIED TO TEXTILES

Kenneth Barnes  
(Beeston; Assistant Works Chemist, Shaw & Marvin Ltd.)  
Zilvester Bergman  
(Coventry; Senior Laboratory Assistant, Courtaulds Ltd., Dyeing Department)  
Ernest Nuttall Edge  
(Bolton; Technical Representative, Allied Colloids (Bradford) Ltd., Manchester)  
Hamish Macnaughton Elder  
(Newton Mearns; Lecturer in Textile Testing, Royal College of Science and Technology, Glasgow)  
Munna Lal Gupta  
(Manchester; Trainee, The Clayton Dye-stuffs Co. Ltd.)  
Gustav Arne Holmebakk  
(Norway; formerly with Courtaulds Ltd.)  
Graeme Kitchen  
(Halifax, Yorkshire; Assistant Practical Dyer, N. Ingham & Co. Ltd., Sowerby Bridge)  
Reginald Neville Pineger  
(Manchester; Assistant Chemist, Works Dyehouse, The Clayton Aniline Co. Ltd., Manchester)  
Harold Craven Powell  
(Bradford, Yorkshire; Foreman Technical Dyer, Aykroyd & Grandage)  
Fred Sadler  
(Ramsbottom, near Manchester; Assistant Colourist, Turnbull & Stockdale Ltd.)  
Brian Sellars  
(Hebden Bridge, Yorkshire; Assistant Dyer, John Whiteley Ltd., Mytholmroyd)  
Alan Lomas Shackleton  
(Sutton-in-Ashfield; Assistant to Manager, Ashfield Dyeing & Finishing Co. Ltd.)  
Alan Shenton  
(Loughborough; Yarn Dyer, Loughborough Dyeworks Ltd.)  
John Arvon Thomas  
(Mansfield; in charge of Dyeing and Routine Chemical Laboratory, William Hollins & Co. Ltd.)

#### BRANCH 6—TINCTORIAL TECHNOLOGY AS APPLIED TO COATED FABRICS, LEATHERCLOTHS, LINOLEUM, ETC.

James Hawkesworth  
(Swinton, Manchester; Chemist, Winter-bottom Book Cloth Co. Ltd., Salford)

#### BRANCH 9—PRODUCTION OF DYES, LAKES, AND PIGMENTS

Donald Burtonshaw  
(Leeds; Head of Standardisation Dept., The Yorkshire Dyeware & Chemical Co. Ltd.)  
James Harry Astbury  
(Manchester; Chemist in charge of Non-Textile General Laboratory, The Geigy Co. Ltd.)  
Dennis Anderson Downey  
(Chadderton, near Oldham; Assistant Technical Officer, Dyeing Research Section, Imperial Chemical Industries Ltd., Blackley, Manchester)  
Peter Bernard Shaw  
(Leeds; Chemist, The Yorkshire Dyeware & Chemical Co. Ltd.)

The following candidates have satisfied the requirements of the Examinations Board in Papers A and B at the Associateship Examination held in 1957—

John Dickson  
Hugh Malcolm Duff  
Stanley Finlay  
John Keith Hanson  
Derek Hunt  
Kenneth Russell Jones  
Bernard John O'Hare  
Dharnidhar Parikh  
Jack Rushton  
Hugh John Stewart Shane

#### Death

We regret to report the loss by death of Dr. R. H. Kienle.

#### New Books Received

British Chemicals and their Manufacturers. London: Association of British Chemical Manufacturers. 1957. Pp. 200.  
1956-1957 Annual Report. London: British Standards Institution. Pp. 272. 7s. 6d.  
Studies in Ancient Technology. Volume 4. R. J. FORBES. Leiden: E. J. Brill. 1956. Pp. vii + 257. 20.00 guilders.  
Chemisorption. Edited by W. E. GARNER. London: Butterworths Scientific Publications. 1957. Pp. xii + 277. 50s. 0d.  
Das Verhalten der direktziehenden Farbstoffe gegen Tierische Fasern, Cellulose- und Kunstspinnfasern. H. GERSTNER. Berlin: Akademie-Verlag. 1957. Pp. 300. DM 28.00.  
Textile Recorder Annual 1957. Manchester and London: Harlequin Press (1955) Ltd. Pp. 182. 30s. 0d.  
Brushmaking Materials. F. KIDD. London: British Brush Manufacturers Research Association. 1957. Pp. xiv + 188 + 96 half-tone illustrations.  
1957 Manual of the Textile Industry of Canada. Edited by W. KING. Montreal: Canadian Textile Journal Publishing Co. Ltd. Pp. 318. \$5.00.

## New Books and Publications

### Progrès réalisés dans le domaine de la Technologie chimique des Textiles

#### Première Partie

### Progrès réalisés dans l'Application des Matières Colorantes

#### Les produits auxiliaires dans l'Industrie textile Volume II

By Louis Diserens. Pp. viii + viii + 533. Paris: Editions Teintex 1952.

This is a revised edition, in French, of Chapters IV and V of *Die neuesten Fortschritte in der Anwendung der Farbstoffe*, which appeared in 1946 and was reviewed in this *Journal* in 1947 (63, 29).

These two chapters, dealing with the azoic and mordant dyes, are based on the earlier German book, but have been rewritten and very considerably expanded, while tables of equivalent products have been revised and brought up to date.

Chapter IV has been expanded from 219 to 327 pages and now gives an excellent survey of the methods of application of the azoic dyes; it contains, in particular, an excellent detailed survey of the stabilised azoic compounds and of their application to the fibre.

The chapter on mordant dyes has been doubled and deals with their application in dyeing and printing. It includes notes on discharging and reserving such dyes on cellulose, protein fibres, and nylon.

The book is well indexed, and the type is easier to read than that used in the earlier edition written in German. It will prove of particular interest to dyers and printers using azoic dyes.

A. THOMSON

### The Reactive Intermediates of Organic Chemistry

By John E. Leffler. Pp. ix + 275. New York and London: Interscience Publishers 1956. Price, \$6.00.

Because this book will be of interest and value only to a limited number of members of the Society, it is necessary to make it clear that the intermediates referred to are not those normally associated in the minds of colourists with dye-making. Nevertheless, these modern "intermediates of organic chemistry"—the free radicals, carbonium ions, and carbanions—are the very stuff from which all organic compounds are formed. Modern work by the Bradley school at Leeds on the modes of formation of certain types of vat dyes of the violanthrone type fully utilises these entities in explaining the mechanisms.

This book explains these concepts in the most lucid fashion of any so far read, whilst being sufficiently complete in its detail, adult in its presentation, and original in its treatment. Previous books on the mechanism of organic reactions have almost invariably followed a historical or quasi-historical sequence via the early

Lowry-Ingold-Robinson resonance hypothesis. Free radicals, which were recognised and isolated in 1900, were usually relegated, as an afterthought, to the last chapter, and no significant connection was usually attained between these and the "organic ions" adduced in the various theories of mechanism.

The present author sets out the concrete evidence for the existence of free radicals and firmly establishes in the mind of the reader the important rôle which they play in the various organic reactions such as polymerisation, degradation of polymers, formation of coloured compounds such as the ketals, and many other startling phenomena. The concepts of carbonium ions and carbanions then seem to be assimilated by the reader most easily.

A masterly survey of the reactions in which these various entities have been shown or are considered to be important is all the more surprising by its very few references to British work. This is no criticism of the work, since the detailed examples offered merely serve to show how poorly British authors on this topic have served their readers in the past in the way of examples of the very voluminous publications of the American workers in the field. It is salutary to find only one reference to the work of M. J. S. Dewar, two to the work of Waters on radicals, and none to that of Hey.

The style is fresh and lucid, often bordering on the racy, but is always stimulating. Best in keeping with the present desire for scientists with a "liberal education" is the naming of a process of group migration (pp. 129-130) the *Hardy effect*, not after the name of the discoverer, but because the group, by virtue of a cage of solvent molecules, is compelled to return to its parent molecule!

Whilst the price is high, the whole work is so stimulating as to be well worth the money to those in any way interested in the modern work on the mechanism of organic reactions.

R. L. ELLIOTT

### Elementary Practical Organic Chemistry

By Arthur I. Vogel. London: Longmans, Green & Co., 1957.

#### Part I

#### Small Scale Preparations

Pp. xv + 347 + xiv. Price, 21s. 0d.

#### Part II

#### Qualitative Organic Analysis

Pp. x + 293 + xxiv. Price, 21s. 0d.

Following the publication of the third edition, in 1956, of the author's monumental *Text-book of Practical Organic Chemistry*, Dr. Vogel and his publishers have now introduced a modified series of three books, the last of which (Part III), covering *Quantitative Organic Analysis*, is in preparation.

The author states that Parts I and II have subject-matter drawn largely, but not exclusively, from his earlier and larger work, so that readers of that work will know in advance something of the material and treatment.

Part I has Chapter I substantially the same as the corresponding chapter on *Theory of General Technique* in the larger work; whilst Chapter II, on *Experimental Technique*, has been reduced from 155 to 111 pages, and the section on *Apparatus with Interchangeable Glass Joints* has been omitted completely. Preparations of aliphatic compounds number 41 compared with 165 in the large work, and those of aromatic compounds number 82 compared with the previous total of 212. A further 21 preparations of miscellaneous compounds, together with two small appendixes, complete the work. The title of "Small Scale Preparations" is somewhat misleading, since the quantities of starting materials recommended have been scaled down to those normally used by (and economically forced on) most students, i.e. of the order of 5-15 g. in most cases. The apparatus required is of standard type or of the smaller available capacity.

The 293 pages of Part II compare with the 72 pages of Chapter XI devoted to this topic in the large work. The main extra space includes 115 pages describing the reactions and characterisation of selected classes of organic compounds. This follows details of the methods for the determination of physical constants, but rather surprisingly precedes the description of the methods for the detection of the elements present in a compound. Under each class of compound described, details are given for the preparation of suitable crystalline derivatives for the purpose of characterisation.

A further important addition consists of a very valuable series of tables of physical constants of organic compounds, which will make this book of real value to experienced and advanced workers, to whom most of the preliminary work of identification described in the early part of the text is axiomatic.

These smaller publications by Dr. Vogel will be welcomed by teachers and students alike, and are a further step forward in the provision of suitable standard textbooks in the ever expanding field of organic chemistry.

R. L. ELLIOTT

**Technique of Organic Chemistry  
Volume X**

**Fundamentals of Chromatography**

By Harold Gomes Cassidy. Pp. xvii + 447. New York and London: Interscience Publishers 1957. Price, \$9.75.

The techniques of gas-liquid and liquid-liquid partition chromatography must surely rank with those involving the use of radioisotopes as the most powerful research tools developed during the past fifteen years. Their application in all fields of science has been so rapid that the literature on paper chromatography alone exceeds 5,000 papers and is increasing at a phenomenal rate. Since advances in technique in other branches of chromatography have been almost equally impressive, the importance of the subject needs no further emphasis. With this in mind the author states that his treatment of chromatography in

Volume V of this series—*Adsorption and Chromatography*—is inadequate, and the present volume constitutes an entirely new work.

The book is designed for those who are seeking to solve their particular problems by the use of chromatography, and deals almost entirely with the principles of the processes involved; for more exhaustive accounts of specialised branches of chromatography the reader is referred to the appropriate monographs.

The first four chapters are concerned with the position of chromatography in relation to other methods of analysis, its nature, the molecular interactions on which chromatographic separations are based, and the general theory of the chromatographic process.

In the chapter on general theory the various branches of chromatography are treated as a whole, and the author has drawn on those papers from the original literature that give a quantitative description of chromatographic processes in terms easily understood by the chromatographer. In ensuing chapters the branches of chromatography—gas-liquid partition, liquid-liquid partition, paper-partition, ion-exchange, adsorption, and foam or emulsion—are described. The theory of each process is described at length, and a wealth of information given on experimental procedures, apparatus, chromatographic materials, solvents, and developers, much of it in tabulated form. Where examples of the chromatographic processes have been used they are generally classics of their kind. Throughout these chapters the author emphasises the importance of the relation between the  $R$  values (or  $V_R$ ,  $R_f$  values) of the molecular components of a mixture and the interactions of these components with the stationary and mobile phases employed. Not only can a clear understanding of this relation yield information on molecular structure, but it may also furnish a clue to the identity of some unknown or unsuspected material with which every chromatographer is faced at some time or another. A special chapter is devoted to this topic later in the book.

Other chapters are devoted to such subjects as the recognition and estimation of separated materials, the choice of stationary and mobile phases, and the uses of chromatography and of electron-exchange polymers. The style is clear and lucid and the book is a pleasure to read, but some of the diagrams, which have been taken in the main from original papers, have lost much of their clarity during reduction in size and reproduction. Errors are few and do not detract from the general high quality of the book, an obvious one being the description of Fig. V-12 on p. 102. More than 1,000 references to original papers are given, and a list of suppliers of chromatographic equipment (mainly American) is appended.

On p. 195 the author observes that research workers are usually only too happy to make use of chromatography for their particular problems, and, without troubling too much about the principles involved, pass on to more interesting things. Such workers would do well to read this book, when they will find "the principles involved" of absorbing



interest. The author is to be congratulated on furnishing a substantial contribution to an already impressive literature on chromatography.

A. ROBSON

### Chemical Engineering Reports

**How to search the Literature and prepare a Report**  
By K. A. Kobe. 4th edition 1957. Pp. viii + 175 (reproduced from typescript). New York and London: Interscience Publishers. Price, \$3.00.

This book has been written to meet a need, recognised in various forms since Sir Clifford Albutt, in the last century, was goaded by the collective illiteracy of M.D. candidates to produce his formidable treatise on how not to do it. Since that time, there have been a number of publications in English designed to encourage the scientific worker to present his record in a seemly and efficient manner. The approach of most of these books has been the same, namely, to combine general hints on what to do with horrible examples to illustrate the chief pitfalls.

The present work is different. It gives information the whole time, and it is very comprehensive and very precise. Thus, specifically for the chemical engineer, but with contents that would be useful to any industrial chemist or physicist, it sets out, first of all, the chief sources of information, indicates what can be found in each of them, and gives very useful hints on the most effective manner of conducting a search of the literature. Then follows a whole series of recommendations for constructing the various kinds of record and communication, from a detailed report to a

business letter. There is a long, detailed, and informative chapter on the mechanical methods of producing material for circulation, including hints on the production of graphs and figures, the various copying processes, how to fold an inset, and even the choice of a typewriter.

For the technical librarian and information officer the work should be invaluable. The research student will find in it much that can help him in the writing of a thesis. It has its drawbacks, however. These do not arise from the lack of effort or lack of skill on the part of the author, but from the general attitude toward the whole problem of report-making as it might affect a student. Because it tells the reader just how the job should be done, and leaves nothing to the imagination, it gives an overpowering impression that any report not presented in the manner so minutely prescribed must be a failure. All the emphasis is on the formal side, and there is no encouragement to cultivate a literary sense which would make a writer instinctively critical of his own performance. It is the lack of this sense in so many scientists that is so deplorable at the present time. In addition, one is impressed by the very full enumeration of sources of information, until one realises what a high proportion of them are American in origin, and that books in foreign languages are scarcely represented at all.

The manner of reproduction has been very happily chosen to show how effectively the compositor can be by-passed when books or reports of limited circulation are being prepared.

H. A. TURNER

## Manufacturers' Publications and Pattern Cards

The Society does not accept any responsibility with regard to the statements in the following notes.  
Any publication abstracted may be referred to by members of the Society on application to  
Dr. C. B. Stevens, Dyeing Department, Leeds University

### Ciba Ltd.

**CHLORANTINE FAST DYES: THEIR APPLICATION AND USE**—This book, which runs to 167 pages, presents collated information on the dyeing and printing properties and fastness characteristics of this range of fast-to-light direct dyes on cellulosic fibres, silk, wool-cellulosic and silk-cellulosic fibre mixtures, and paper. Separate sections are included covering aftertreatment with Lyofix SB conc. and EW and Coprantex B, and the application of synthetic resin finishes. The dyeing characteristics of each member are set out in detail, time-temperature curves being provided for cotton and viscose rayon and time-temperature tables for cotton only. Full fastness data are appended, and a table giving special properties and features is included.

**CHLORANTINE FAST ORANGE RLL**—This direct dye gives reddish oranges on cellulosic fibres. It is suitable for application in circulating-liquor machines, by padding and by high-temperature dyeing techniques. Wet fastness properties of dyeings are improved by aftertreatment with Lyofix SB conc. or EW or Coprantex B. Viscose rayon of unequal dye affinity is covered, and solid dyeings are obtained on cotton-viscose rayon mixtures. This dye is of interest for direct printing and for dyed grounds to be discharged white. Dyeings and prints are unaffected by synthetic resin finishes. Fastness figures for a dyeing on cotton include—Light 6, washing (b) 2, perspiration 3-4 G.

**CIBACRON DYES IN DYEING**—This card describes in detail the dyeing properties and methods of application of

a new range of reactive dyes comprising, at present, the following eight members: Cibacron Brilliant Yellow 8G, Yellow R, Brilliant Orange G, Scarlet 2G, Brilliant Red 3B, Rubine R, Blue 3G, and Turquoise Blue G. When applied to cellulosic fibres under suitable conditions, e.g. at an elevated temperature from alkaline solution, the bulk of the dye is chemically combined with the fibre. Removal of the uncombined dye by thorough rinsing and soaping ensures the production of dyeings of very good fastness to washing. In absence of electrolyte the Cibacron dyes show virtually no affinity for the fibre. These dyes are thus essentially "padding" dyes and may be applied by pad-jig, Pad-Roll, pad-steam, and pad-dry heat methods. Recommended alkalis for fixation include sodium carbonate, trisodium phosphate, and caustic soda, depending upon the conditions of application. Stripping methods include alkaline hydrosulphite, sodium hypochlorite, sodium chlorite, and acid permanganate. Although none of these alone will give a complete strip with all Cibacron dyes, sodium chlorite followed by hydrosulphite will almost completely strip all dyeings, and hydrosulphite followed by hypochlorite also gives very good results. Dyeings in five depths of each dye on mercerised cotton are included together with twenty mixture dyeings. The degree of reservation of other fibres is illustrated by dyeings on composite samples of cotton plus eight other fibres. In certain cases white or near-white discharges of dyed grounds may be obtained using either neutral or alkaline hydrosulphites. Addition of Uvitex VR improves the white.

Fastness figures on mercerised cotton include—

	Light	Washing (E.C.E.b)
Cibacron Brilliant Yellow 3G	7	5
Cibacron Yellow R	6-7	4-5
Cibacron Brilliant Orange G	5	4 redder
Cibacron Scarlet 2G	4-5	4-5
Cibacron Brilliant Red 3B	5-6	5
Cibacron Rubine R	6-7	5
Cibacron Blue 3G	6-7	4
Cibacron Turquoise Blue G	6	4 yellower

**CIBALAN BLUE FBL**—This neutral-dyeing metal-complex dye gives blues of very good fastness to light and wet treatments on wool, polyamide fibres, and silk, to which it may be applied in all stages of manufacture, but particularly to loose fibre, slubbing, and yarn. It shows no alteration in hue in artificial light. Fastness figures on wool include—Light 6, washing (b) 4-5, alkaline milling (b) 4-5.

**CIBALAN NAVY BLUE RL**—This neutral-dyeing metal-complex dye gives reddish navies on wool, polyamide fibres, and silk as loose fibre, slubbing, yarn, and cloth, the dyeings obtained having fastness characteristics associated with this class of dye. It is also of interest in mélange printing. Fastness figures on wool include—Light 6-7, washing (b) 4, alkaline milling (b) 4-5.

**CIBALAN DYES ON WOOL SLUBBING**—This latest edition contains dyeings in six depths on wool slubbing of 25 Cibalan and 3 Cibalan Brilliant dyes. Cibalan Black BGL is also shown in six depths shaded with  $\frac{1}{2}$  and  $\frac{3}{4}$  of its weight of Cibalan Blue 3G. Twenty-seven mixture dyeings are included.

**NEOSOL PRINTING BLACK BD: NEW PRINTING RECIPE**—With the new recipe described in this card it is claimed that more intense blacks can be obtained with greater colour yield. Prints show good stability before steaming and there is no halo formation when it is printed alongside other classes of dyes, including vats, solubilised vats, azoics, and direct. Print pastes are more stable. Fastness figures include—Light (as a black) 7-8, (as a grey) 7, washing (c) 5, chlorine (b) (as a black) 3.

**ULTRAYON JU**—A non-ionic wetting, scouring, and dispersing agent universally applicable in textile processing.

**CIBA REVIEW NO. 120**—To mark the introduction of the first eight reactive dyes under the generic name of *Cibacron dyes*, a special number of the *Ciba Review* has been issued. By tradition, each issue of *Ciba Review* deals with a particular topic in a general way without specific reference to Ciba products. The importance of the successful development of their range of reactive dyes is considered sufficient reason for departing from this procedure. The present issue contains sections dealing with the application of these dyes in dyeing and printing and with the stripping of Cibacron dyeings. Full practical details and fastness data are included. Each section is illustrated with diagrams in black and white and in colour, and samples of dyed and printed materials are appended.

#### Clayton Dyestuffs Co. Ltd.

**ACID DYES ON WOOL YARN**—This card contains dyeings in three depths on wool yarn of 66 Kilon and related dyes, 41 Kilon Fast dyes, 29 Benzyl dyes, 50 Benzyl Fast and Alizarin Fast dyes, 4 Cloth Fast Blue dyes and (in a supplement in two depths) 4 direct dyes. In addition to the normal information regarding dyeing behaviour and the fastness properties of the dyeings obtained, the S.D.C. classification for dyeing method and migration is given for each dye, and full details of the method of determining these are reprinted.

**CIBACET DYES ON ACRILAN**—A dyeing method is given for producing a wide range of colours on Acrilan using the Cibacet range of disperse dyes, which are of special interest for dyeing knitting yarns and knitted fabrics, as they provide adequate fastness to light, washing, and perspiration. Fastness figures for a range of 13 dyes are appended.

**CIBALAN DYES ON ACRILAN AND ACRILAN-WOOL UNION**—The majority of the Cibalan range of metal-complex dyes can be applied to Acrilan to give dyeings of

good fastness to wet treatments, and selected members are of interest for solid dyeings on Acrilan-wool mixtures. In both cases their use is, however, limited to the production of pale colours. With few exceptions, the fastness to light of this range on Acrilan is good. For dyeing Acrilan alone addition is made of 8% sulphuric acid or 5% sulphuric acid plus 2-3% Cibalan Salt N. As an alternative, and for the dyeing of Acrilan-wool mixtures, pretreatment in sulphuric acid (2 g./litre) at the boil, followed by rinsing and dyeing in presence of 4% of Cibalan Salt S, is recommended. Fastness figures for 27 Cibalan dyes on Acrilan are given.

**NEOLAN DYES ON ACRILAN AND ACRILAN-WOOL UNION**—These strongly acid-dyeing metal-complex dyes are of interest for producing dyeings of medium to full depths on Acrilan where a good standard of fastness to wet treatments is required. Further, a number are of value for producing solid dyeings on Acrilan-wool mixtures. In both cases, addition of 8% of sulphuric acid or 5% of sulphuric acid plus 3-4% of Neolan Salt P is recommended. With Acrilan-wool mixtures an alternative procedure is to pretreat the material in sulphuric acid (2 g./litre) at the boil for 30 min., and then rinse and dye at the boil as before for at least 90 min. Fastness figures for 24 Neolan dyes on Acrilan are given.

#### The Geigy Co. Ltd.

**CUPROPHENYL BLUE 3GL**—This direct dye (S.D.C. classification: Group A) gives on cellulosic fibres greenish blues of good fastness to light and wet treatments when aftertreated with copper salts. It is of interest, alone and in mixtures, for dyeing dress and furnishing fabrics, knitted goods, sewing yarns, and the cellulosic component of fibre mixtures. Secondary cellulose acetate is completely reserved. Fastness figures on cotton include—Light 6, washing (Test B) 3-4, perspiration 4.

**CUPROPHENYL GREEN 2BL**—This direct dye (S.D.C. classification: Group B) gives bluish greens on all forms of cellulosic material when aftertreated with copper salts. The fastness to light of the dyeings obtained is outstanding even for this range of dyes, and this member is recommended for use, alone and particularly in combination with Cuprophenyl Yellow 3GL, which has very similar dyeing properties, on furnishings and outer wear. Barry viscose rayon is well covered, and secondary cellulose acetate is completely reserved. It is also suitable for crease-resist finishings and for dyeing the cellulosic portion of fibre mixtures. It is also of interest for dyed grounds in printing, since good white discharges may be obtained. Fastness figures on viscose rayon include—Light 7, washing (Test B) 4-5, perspiration 4-5.

**IRGALAN BLACKS RBL AND GBL**—These neutral-dyeing metal-complex dyes are outstanding in that they give greys to full blacks of excellent fastness to light and wet treatments on all forms of wool, polyamide fibres, and silk. The Black RBL gives slightly reddish blacks, and the GBL brand rather greenish blacks, so that any desired hue may be obtained by combining the two. They are suitable also for shading and are of considerable interest in mélange printing. Fastness figures on wool include—

	Black RBL	Black GBL
Light (as a black)	7-8	7-8
Washing (Test B)	5	5
Severe milling	4	4

**IRGALAN RED 4GL**—This neutral-dyeing metal-complex dye gives yellowish reds of good fastness to light and wet treatments on all forms of wool, polyamide fibres, and silk goods. It is also readily dischargeable and is of interest for dyed grounds. Fastness figures on wool include—Light 6, washing (Test B) 4-5, severe milling 4-5.

**COMBINATION SHADES WITH IRGALAN AND IRGANOL 8 DYES ON WORSTED YARN**—This card contains a range of fashion colours on worsted yarn, each in three depths, produced with 80 different combinations of Irgalan and Irganol 8 dyes.

**UNIPHENYL FAST DYEESTUFFS**—This card contains dyeings in two depths (except in the case of the navy blue and the black) on wool-cotton mixture cloth of a range of 28 dyes primarily intended for dyeing 50 : 50 wool-cotton mixtures as yarn or woven or knitted cloth. They also

give good solidity of colour on 50 : 50 wool-viscose rayon mixtures. The light fastness of the dyeings is within the range 4-6. Lists of dyes suitable for shading the wool or cellulosic portion are appended.

**DIRECT DYE STUFFS FOR VISCOSE RAYON TUFTED CARPETS**—This card contains dyeings in two depths on delustrated viscose rayon staple carpet yarn of 21 Solophenyl and Diphenyl Fast direct dyes suitable for application to the loose staple fibre, to the yarn, or, in the case of 100% viscose rayon carpets, to the carpet itself before or after latexing. The dyes chosen are compatible in mixtures and contain no copper, and dyeings are unaffected in hue and fastness by variations in the latex formulation.

**WOOL DYE STUFFS**—This latest wool card is a very fine production containing dyeings in three depths on wool gaberdine of 185 dyes. These are grouped according to type as follows: level-dyeing acid dyes (subdivided according to light fastness), weakly dyeing acid dyes, Polar, Irgalan, Irganol, and Eriolan dyes. All the usual information on dyeing behaviour is given together with comprehensive fastness data. For better viewing, the patterns are mounted on black card, and the adjacent text is printed on grey paper.

**PAD-DYEING WITH CUPROPHENYL DYES**—This card contains aftercoppered pad-dyeings in four depths on cotton cloth of 19 Cuprophenyl dyes and, in two depths, of a further 20 mixtures. These dyes have proved very suitable for producing both pale and deep dyeings by both continuous dyeing or pad-jig development, the fastness obtained being equal to that of conventional jig dyeings. Using continuous processing, the padded dye is fixed by steaming, with or without subsequent passage through a salt bath. With pad-jig development, fixation is carried out in a salt bath at or near the boil, any shading to pattern necessary being carried out at this stage.

**PAD-DYEING WITH SOLOPHENYL AND DIPHENYL FAST DYES**—This card contains pad-dyeings in five depths on cotton cloth of 36 Solophenyl and Diphenyl Fast dyes which have proved to be most suitable for pad-dyeing using either a continuous or discontinuous method. Dyeings in two depths of 20 mixtures are included.

**FASHION COLOURS WITH SOLOPHENYL DYES ON BLEACHED COTTON YARN**—The Solophenyl range of direct dyes contains a number of homogeneous products in the brown, bronze, grey, and khaki colour groups which have almost identical dyeing characteristics and which are particularly suitable for dyeing soft furnishing and curtain materials and rainwear. In many cases not more than three of these are required to reproduce the most difficult colours without the need for shading with yellows, oranges, reds, blues, and violets. This card contains dyeings in three depths on bleached cotton yarn of 42 popular colours, using, with one exception, not more than three dyes from the fast-to-light range recommended.

**IRGANOL BRILLIANT YELLOW 3GLS**—This acid dye gives bright pure yellows of excellent fastness to light on wool and polyamide fibres, to which it is applied from neutral or weakly acid dyebaths. It is entirely compatible with the other members of the Irganol S and Irgalan ranges, and is recommended for use alone and in mixtures on wool, nylon, and wool-nylon materials at all stages of manufacture. Fastness figures on wool include—Light 6, washing (S.D.C. Test 2) 5, chlorination (wet) 4.

#### Imperial Chemical Industries Ltd.

**PROCION DYES IN TEXTILE DYEING**—This card contains all the information available to date on the application of Procion Yellow R, Brilliant Red 2B, and Blue 3G to cellulosic, protein, and polyamide fibres by both batch and continuous methods. A most comprehensive range of dyeings of each dye is included. Thus Procion Yellow R is shown jig-dyed on mercerised poplin, padded and winch-developed spun viscose rayon staple cloth, yarn-dyed in hank form on nylon staple yarn and spun silk yarn, while a further set of patterns shows the results obtained by different dyeing techniques on cotton, viscose rayon, linen, viscose rayon-cotton, and viscose rayon-cellulose acetate materials. The rate-of-dyeing curves illustrating the exhaustion properties of each dye on cotton given in *Technical Information Leaflet: Dyehouse No. 348* are reproduced. Fastness figures for a standard-depth dyeing on cotton (standard depth for Procion dyeings =  $\frac{1}{2}$  depth taken as "normal standard depth for

all fibres", given in *The Fastness Assessment of Textile Dyestuffs*, 2nd edition) include—

Procion Dye	Light	Washing (5 times at 100°C.)	Perspiration
Yellow R	6	3-4	4
Brilliant Red 2B	5	5	4-5
Blue 3G	6-7	3-4	4-5

**PROCION DYES IN TEXTILE PRINTING**—Like its companion reviewed above, this card collates the currently available information on the use of the first three Procion dyes in textile printing on cellulosic materials. Processes described in detail include the preparation of the print pastes and printing recipes; development by steaming and without steaming; Procion dyes printed alongside Alcian X, vat, solubilised vat, azoic, and Brentogen dyes; recent styles, including results under Procions and also with the latter as illuminating colours. Prints are included on cotton and viscose rayon of the individual dyes, alone and in mixture with each other, to illustrate typical styles, and a tabular synopsis is given of printing behaviour alongside other classes of dyes and procedures to be followed in each case. Fastness figures for a print on viscose rayon include—

Procion	Light (standard depth)	Washing (Test No. 3, once at 85°C.)
Yellow R	6-7	4-5
Brilliant Red 2B	6	4-5
Blue 3G	7	4

**PROCION DYE STUFFS IN TEXTILE DYEING: VOLUME 2**—This loose-leaf type of card is identical in format with the one reviewed above. As issued, it contains full information on the application of Procion Brilliant Blue R. This addition to the range of Procion dyes requires more strongly alkaline conditions for fixation in the batchwise dyeing of cotton. Trisodium phosphate or sodium metasilicate is recommended. Only pale colours are obtainable on cellulosic fibres by the pad(bicarbonate)-dry process. The recommended hydrosulphite followed by chemic strip reduces the colour to deep grey only. In addition to its use on cellulosic fibres, Procion Brilliant Blue R is of interest on nylon and silk.

**PROCION DYE STUFFS IN TEXTILE PRINTING: VOLUME 2**—With the appearance of further reactive dyes of the Procion range, a second loose-leaf binder has been issued identical with that holding the printing data sheets for the three Procion dyes reviewed above. The data sheets themselves follow a standard pattern, giving the general method of application, additional methods of use (e.g. alongside Alcian X dyes and on Brenthol prepares), special notes on printing behaviour, and fastness data. Direct prints of each dye, alone and in combination with other Procions, and multicoloured prints are included.

Data sheets describing the application in dyeing and/or printing of the following additional members of the Procion range of reactive dyes have appeared for inclusion in the appropriate binder—

**PROCION BRILLIANT YELLOW 6G**—This gives bright greenish-yellow dyeings, of excellent fastness to light and good fastness to washing, on cellulosic fibres by any of the established procedures. It does not promote catalytic fading and is of interest for dyeing materials subsequently to be crease-resisted. It is moderately suitable for dyeing filament viscose rayon of irregular quality. In batchwise dyeing the best colour value is obtained with trisodium phosphate. It is suitable also for dyeing silk and nylon. Fastness figures on cotton include—Light 6-7, washing (once at 85°C.) 5.

**PROCION BRILLIANT ORANGE G**—Bright, reddish oranges of good fastness to light and washing are obtainable on cellulosic fibres by any of the established dyeing procedures. For batchwise dyeing on cotton optimum results are obtained with trisodium phosphate as the alkali. It is of interest also on silk and nylon. Care should be taken to avoid contamination of the dyebath with iron or copper ions. Fastness figures on cotton include—Light 5 (in standard depth for pale dyeings 4-5), washing (5 times at 100°C.) 3-4.

**PROCION BRILLIANT YELLOW 6G**—This member of the Procion range is of interest for direct printing on cellulosic fibres, alone and in combination with Procion Blue 3G, with which it gives bright greens, of excellent fastness to light, which fade on tone. It may be printed alongside the Alcian X dyes and on Brenthol prepares. The colour becomes much duller on aftercoppering, and it is thus not suitable for use alongside direct dyes to be aftertreated in this way. Fastness figures on viscose rayon include—Light 6-7, washing (Test No. 5; 5 times at 100°C.) 3.

**PROCION BRILLIANT ORANGE G**—In printing, this dye is of interest for producing bright oranges, pinks, and scarlets (in combination with Brilliant Red 2B) and browns (with Brilliant Red 2B and Blue 3G) on all types of cellulosic materials. It may be used alongside Alcian X dyes and on Brenthol prepares. When processed alongside Soledons developed by the nitrite process the colour becomes a little duller. The Procion dyes must be fixed first by steaming. Fastness figures on cotton include—Light 5, washing (Test No. 3, once at 85°C.) 4.

**PROCION BRILLIANT RED H3B**—This new reactive dye of the Procion range is of particular interest in printing cellulosic materials. Used alone, it gives bright bluish reds and is useful also for bright scarlets in combination with Procion Brilliant Orange G. It may be printed on Brenthol prepares. It will not withstand aftercoppering, and prints become bluer during the nitrite development process for Soledons. Fabrics printed with it show good stability to storage. Fastness figures on viscose rayon include—Light 5, washing (Test No. 5, 5 times at 100°C.) 4.

**PROCION BRILLIANT BLUE R**—Bright reddish blues are obtained on cellulosic fibres by direct printing, and it is also of interest as a component of browns, violets, greens, and greys. The colour is destroyed by the nitrite development process for Soledons. Fastness figures on viscose rayon include—Light 6-7, washing (Test No. 5, 5 times at 100°C.) 3-4.

**PROCION BRILLIANT BLUE H7G**—This new Procion dye gives bright turquoise blue prints on cellulosic fibres. Using recipe 1, it is desirable to steam printed cottons for at least 5 min. and viscose rayon materials for not less than 10 min. It is suitable for application by non-steam procedures requiring the use of recipe 3, but the colour yield is somewhat lower. The hue is unaffected by the nitrite development process for Soledons and by aftercoppering. Fastness figures on viscose rayon include—Light 6, washing (Test No. 3, once at 85°C.) 4-5.

**PROCION PRINTING GREEN B**—This new reactive dye is specifically recommended for printing cellulosic fibres. Bright greens, somewhat yellower on viscose rayon, are obtained, of good fastness to washing and very good fastness to light, which fade on tone. When applied by non-steaming methods it gives yellower greens. It may be printed alongside Alcian X dyes, but not on Brenthol prepares.

The colour of prints is unaffected by the nitrite development process for Soledons, but becomes slightly duller on aftercoppering. Fastness figures on viscose rayon include—Light 5-6 (in standard depth for pale colours 5), washing (Test No. 3, once at 85°C.) 3-4 yellower.

**PROCION PRINTING GREEN 5G**—This new reactive dye is specifically recommended for printing cellulosic fibres, on which it gives bright yellowish greens, somewhat yellower on viscose rayon than on cotton. As with Procion Printing Green B, prints of good fastness to light and washing are obtained, and it is recommended for furnishings. It is not suitable for application to Brenthol prepares. Development by the nitrite process for Soledons reddens the colour a little, while aftercoppering dulls it considerably. Fastness figures on cotton include—Light 4-5 (in standard depth for pale colours 4-5), washing (Test No. 3, once at 85°C.) 4 yellower.

**TECHNICAL INFORMATION LEAFLETS**—*Dyehouse No. 346. Determination of the Hot Solubility of Dyestuffs*—Details are given for estimating the solubility of a commercial dye by determining the concentration of dye present in solution at equilibrium using increasing known amounts of solid dye, undissolved dye being removed by filtration through glass-fibre filter paper. From the solubility curve which may then be drawn relating dye dissolved to dye added, at the temperature employed, the maximum solubility can be easily deduced.

*Dyehouse No. 350 (replaces No. 300). Subject Index to Technical Information Leaflets (Dyehouse) Nos. 161-349.*

*Dyehouse No. 351. Colours for Ready Mixed Paints. British Standard 381C : 1948.*

*Dyehouse No. 352. Discharges of Dyestuffs on Vegetable-tanned Leather*—Results are given of an investigation of the stripping action of freshly prepared 5% and 10% solutions of sodium hydrosulphite on vegetable-tanned leather dyed with acid, basic, and selected direct dyes at 35°C. for 15 min.

*Dyehouse No. 354. Woollen and Worsted Color Card of America; Fall and Winter, 1957.*

*Dyehouse No. 355. Alcian X Dyestuffs: A Survey of Printing Methods for Cotton*—The Alcian X range has been extended by the introduction of Alcian Blues 2EX and 5GX; and a new printing assistant, Alcian Developer X, has been developed, the use of which is essential for the best results from these new dyes. The various Alcian printing recipes and their scope, and the choice of recipes for particular purposes, are summarised in tabular form.

*Dyehouse No. 356. Water Fastness of Dyestuffs on Mordant Chrome Glazing Leather.*

*Dyehouse No. 358. Pigments: Fastness to Solvents*—Data are given for the bleeding of a full range of pigments in eight different solvents.

*Dyehouse No. 359. 1957 Fall and Winter Color Card of America: Man-made Fibers and Silk.*

*Dyehouse No. 360. Procion Dyestuffs: Printing of Pale Shades on Cellulosic Fibres*—In pale depths, Procion Yellow R, Brilliant Red 2B, and Blue 3G, printed on cellulosic fibres and fixed by steaming, may fail to give the required depth of colour if steaming is prolonged (e.g. for 15 min.). By taking advantage of the rapid fixation of these dyes and steaming for 2-5 min. only, this effect is not nearly so pronounced. If prolonged steaming is unavoidable, 0.5-1% of Resist Salt L added to the print paste is valuable in maintaining consistency of colour yield.

*Dyehouse No. 361 (replaces No. 292). Clean-to-handle Copy Carbon Papers: Spot Test to determine Suitability of Copy Paper.*

*Dyehouse No. 362. Printing of Caledon and Durindone Dyestuffs by the Flash-Ageing Process*—Recommendations are made, as a basis for large-scale trials, regarding choice of dye and thickening, padding and steaming conditions, and preparation of print pastes. A note is added on the use of Alcian Blue 8GX in augmenting the colour range. Fastness data for prints produced by this technique with a range of Caledon and Durindone dyes are appended.

*Dyehouse No. 363. Procion Dyestuffs: Application to Cotton, Linen, and Viscose Rayon by Batchwise Dyeing Techniques, Supplement No. 1*—More detailed information is given on the relations between depth of colour, liquor ratio, and optimum concentration of alkali in dyeing cellulosic fibres. For cotton, mercerised cotton, and linen, sodium carbonate is replaced by the stronger alkali, trisodium phosphate (readily available as  $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ ). A 5-10%, or even greater, increase in colour value may thereby be obtained. For viscose rayon, sodium carbonate is still the most satisfactory alkali, but with cotton-viscose rayon mixtures trisodium phosphate is preferred, since the cotton is dyed more deeply and the rayon less deeply, giving a more solid dyeing than when sodium carbonate is used.

*Dyehouse No. 364. The Dyeing of Acrilan, Supplement No. 2—Disperse Dyestuffs*—More detailed information is given on the dyeing and fastness properties of disperse dyes on Acrilan. The data provided in T.I. (Dyehouse) No. 176 and 315 is thereby superseded.

*Dyehouse No. 365. Dyeing and Finishing of Full-chrome Black Suede for Upper Leather.*

*Dyehouse No. 367. Aqueous Solubility of Chlorazol and Durazol Dyestuffs*—The increasing use of padding methods for applying water-soluble dyes to cellulosic fibres has made knowledge of the solubility of direct dyes of particular importance to the dyer. Solubility figures are given for a range of direct dyes in distilled water at 50°C. as determined by the filtration equilibrium method described in T.I. (Dyehouse) No. 346.

*Dyehouse No. 368. Fizarol PN for the Fixation of Pigment Dyestuffs on Absorbent Paper.*

*Dyehouse No. 370. Printing of Viscose Rayon Tufted Carpet with Procion Dyestuffs*—A tentative process for



printing Procions on viscose rayon tufted carpet is outlined. These dyes are considered to be of potential interest for this new development in colouring carpets, since they readily penetrate the pile structure, react effectively with the cellulose either during a short steaming or if allowed to remain in contact with it for some hours at low temperature, and any unfixed dye is non-substantive to cellulose, so that production of an unstained ground should present no problem.

**Dyehouse No. 371. Cirrasol AR: Processing Aid for Woolen System Spinning.**—A general method for using Cirrasol AR, a water-soluble lubricant, instead of oleine or mineral-oil blends is described. It has already been used on a large scale for lubricating wool-viscose rayon staple fibre blends for carpet yarns. Advantages claimed include elimination of the need for scouring before dyeing or at least for severe alkaline scouring. Further, with rayon staple, the complete removal of oleine or oil by conventional scouring is difficult, but, if not achieved, rapid soiling of the material will occur in use. When Cirrasol AR is used as the lubricant, these difficulties are not encountered.

**Dyehouse No. 373. Light Fastness of Dyestuffs.**—Significant differences in assessment are found when patterns are sensitive to differences in humidity during exposure to daylight, such patterns being rated higher if exposure is made in a sunny climate than in a cloudy one. Azoic dyeings on cellulosic fibres are particularly prone to give variations of this kind. Consequently, two assessments will be given in future. One based on exposures made at Wiltshire, Cheshire, during April-September, and the other on exposures made in Bombay during October-May. The first station is typical of the cloudy areas of the world (average sunshine during exposure period 4 hr. per day), the second of the sunny areas (10 hr. per day). If a dyeing is sensitive to humidity the Wiltshire result will be lower than the one from Bombay. Since the two stations are believed to represent almost the two extremes, an indication of the light fastness to be expected in any other area can be deduced from its sunshine figures.

**Dyehouse No. 376. Procion Dyestuffs: The Printing Properties of Recent Additions to the Range.**—This leaflet describes the printing characteristics and the fastness properties of seven more reactive dyes added to the Procion range. Like Procions Brilliant Red H3B and Brilliant Blue H7G (N.B. Procions Printing Green B and Printing Green 54) may also be regarded as "H" brands in this connection) they differ chemically from the earlier Procions. They are less reactive. Consequently, the print-paste stability is very good: at least 28 days storage is possible without significant loss in printing strength. They are not at present recommended for application by the non-steaming method or by "cold-fixation". In other respects they exhibit the same desirable properties as the other Procions, with which they are compatible. Fastness figures for a print on cotton include—

Procion	Light (xenon arc)	Washing (once at 85°C.)
Brilliant Yellow H5G	6-7	4-5
Yellow HA	6-7	5
Brilliant Orange HGR	5	3-4 yellower
Scarlet H3G	4	4 yellower
Brilliant Red H7B	4-5	4-5 yellower
Rubine H2B	6	4-5
Blue HB	6-7	4-5

#### Sandoz Products Ltd.

**SANDOTHIENE OLIVE NB2G: SANDOTHIENE OLIVE NF2B.**—These two vat dyes give yellowish and bluish olives, respectively, on cellulosic fibres and are recommended for use alone, and in combination with other

Method I dyes, for dyeing yarn and cloth where very good fastness to light, washing, and soda boiling-hypochlorite bleaching is required. They are suitable for pigment padding, Olive NF2B being available also in ultradispersed powder and paste form. Fastness figures on cotton include—

Sandothrene	Light	Washing (95°C.)	Chlorine
Olive NB2G	7-8	5	4-5
Olive NF2B	8	5	5

**SOLAR GREY 3LR: CUPROFIX GREY 3LR.**—This direct dye gives bluish greys of very good fastness to light on cellulosic materials. The wet fastness of the dyeings is increased by aftertreatment with Sandofix WE, and still further improved by aftertreatment with Cuprofix SL, the final colour in this case being somewhat less blue. Dyeings are unaffected by crease-resist finishing. It gives solid dyeings on cotton-viscose rayon mixtures and is suitable for dyeing at temperatures above 100°C. It is of interest also for direct printing. Fastness figures on cotton include—

	Light (daylight)	Washing (60°C.)	Perspiration
Direct dyeing	7	2	3-4
Aftertreated with Cuprofix SL	6	4-5	4-5

**SOLAR NAVY GLA: CUPROFIX NAVY GLA.**—This direct dye gives slightly greenish navies of very good fastness to light on cellulosic materials. The wet fastness properties are improved by aftertreatment with Sandofix WE or Cuprofix SL, when the hue becomes greener still, the light fastness being only slightly affected. Dyeings are unaffected by crease-resist finishing. Fastness figures on cotton include—

	Light (daylight)	Washing (60°C.)	Perspiration
Direct dyeing	7-8	1	1-2
Aftertreated with Cuprofix SL	7	4-5	4-5

**SULFONINE NAVY RWL.**—This homogeneous acid dye is recommended for application to wool from weakly acid dyebaths to give full navies of excellent fastness to light and good fastness to wet treatments, in particular acid milling, carbonising, and cross-dyeing. It is stable to dichromates in the dyebath, is dischargeable to a good white, and is suitable for dyeing at temperatures above 100°C. It is of interest also on silk. Fastness figures on wool include—Light (daylight, SNV test) 6-7, cross-dyeing (SNV) 4-5, alkaline milling (SNV; strong) 4-5.

**VISCOLAN FAST DYE STUFFS.**—Dyeings in three depths on wool-cotton mixture cloth of 12 Viscolan Fast dyes are included in this card. The dyes, which have good solubility and are very level dyeing, are particularly recommended for producing fashion colours on yarn and cloth. Dyeings on wool-cellulosic fibre mixtures have good fastness to light, even in pale depths and, in medium depths, good fastness to wet treatments. Aftertreatment with Sandofix WE is advisable in the case of heavy dyeings, since the wet fastness is thereby improved.

**SANDOFIX WE: CUPROFIX SL; RESOFIX CU.**—This booklet gives details of the properties and uses of these three products for aftertreating dyeings and prints on cellulosic fibres to improve their fastness to wet treatments. An interesting feature is the inclusion of a number of analytical methods for estimating the amount of fixing agent present in partly used baths.



# Abstracts from British and Foreign Journals and Patents

The titles of abstracts may be modified. Abbreviations of names of firms are listed in J.S.D.C., 68, 23 (Jan. 1952) and also, together with symbols and the periodicals abstracted, in the annual index

## I—PLANT; MACHINERY; BUILDINGS

### PATENTS

#### Pressure Rollers for Sizing Machine

Maschinefabrik Ruti

BP 775,051

A pressure or squeeze roller in which the tendency to bend is considerably reduced. C.O.C.

#### Drum Washing or Dry-cleaning Machine

Baker Perkins

BP 774,115

The flow of rinse liquor through the machine is controlled by ganging the rinse inlet valve and the rinse outlet valve together by a connecting link so that they are interlocked to open and shut together. C.O.C.

#### Drying of Webs

Mitchell Engineering

BP 779,326

Improved drying of paper of inherently low tensile strength is achieved by means of radiating elements in the form of arcuate chambers concentrically complementing the circumferential portions of the steam heated rolls carrying the web. A high-boiling-point heat exchange liquid, e.g. a chlorinated biphenyl product, is circulated in the arcuate chambers to provide radiant heat, a temperature of  $< 350^{\circ}\text{F}$ . being maintained. G.S.B.

#### Feeding Cloth to Tenting Machines

Vits-Elektro

BP 775,676

A device which gives the operator unobstructed view of the work and allows any necessary amount of tension to be applied to the cloth feed. C.O.C.

#### Heating and Drying a Continuous Length of an Organic Fibrous Material

P. Lippko

BP 774,227

Improved drying of a continuous length of organic fibrous material is obtained by passing an electric current along the length of the wet web from one pressure cylinder to a second cylinder. The electric current is an alternating one whose voltage is such as to develop sufficient heat to cause evaporation of water. The frequency of the current is sufficiently high and such that its periodic variations in intensity do not produce appreciable differences in the resulting temperature of individual parts of the rapidly moving web. One drying cylinder may act as a common electrode while the others in the group form a plurality of counter electrodes to pass the current through a length of the web. G.S.B.

Full-width Washing (VII p. 481)

Embossing Cloth or Plastic Films (X p. 484)

## III—CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

### Critical Micelle Concentrations of Decyl-, Dodecyl-, and Tetradecyl-amine Hydrochloride

H. W. Hoyer and A. Greenfield

J. Phys. Chem., 61, 818-819 (June 1957)

Critical micelle concentrations are determined by a conductance method. The critical micelle concentration decreases with increasing length of hydrocarbon chain. For the dodecylamine hydrochloride the critical micelle concentration decreases by about 5.5% over the temperature range 18–35°C. W.R.M.

### Micelle Formation by Dodecylammonium Salts of Fatty Acids in Non-polar Solvents

A. Kitahara

J. Colloid Sci., 12, 342-343 (June 1957)

Values of critical micelle concentration and solubilising power are obtained from studies of the solubilisation of water in solutions of dodecylammonium butyrate and caprylate in benzene, cyclohexane, and carbon tetrachloride. W.R.M.

### PATENTS

#### Wetting, Emulsifying, and Washing Agents

Ruhrchemie

BP 778,719

A compound of formula  $\text{R-NH}_2\text{-HCl}$  (R = Alk of 3–6 C)

is sulphochlorinated in an inert liquid, the product hydrolysed, and then treated under alkaline conditions with an aliphatic carboxylic acid chloride of 9–26 C. C.O.C.

#### Detergent

Colgate-Palmolive Co.

USP 2,738,333

Addition of a small amount of a compound of formula—



(OR<sup>1</sup> = higher fatty acyl radical; X = O or imino; Y = alkylene or hydroxy alkylene of 2–6 C; R<sup>2</sup> = H, Alk or hydroxy alkyl), e.g. lauric acid ester of N-hydroxyethyl urea, to an anionic sulphate or sulphonate detergent, gives much increased detergent power. C.O.C.

#### Emulsions

Newton, Chambers & Co.

BP 778,901

Stable aqueous acid emulsions of hydrocarbons are obtained with the use of two anionic surface-active agents each of formula—



(R = Alk or aryl-alkyl) one of which is preferentially soluble in the hydrocarbon and the other in water.

BP 778,903

All or part of the hydrocarbon-soluble surface active agent may be replaced by a hydrocarbon-soluble phenol or phenolic compound of a hydrocarbon-soluble alcohol. A convenient procedure is to form a first emulsion in which the hydrocarbon is the continuous phase and then to invert this emulsion in aqueous acid so that water becomes the continuous phase. The first emulsion contains the hydrocarbon, water, both the surface-active agents and acid.

BP 778,902

The acid can be eliminated from the first emulsion if the ratio of the two surface-active agents is such that the water-soluble agent dissolves in the mixture. C.O.C.

### Antistatic Lubricant for Synthetic High Polymer Fibres

Vereinigte Glaszstoff-Fabriken

BP 775,947

The products formed by reacting (a) a compound of formula—



(R = H, CH<sub>3</sub> or C<sub>2</sub>H<sub>5</sub>; n = 2, 3 or 4) produced according to BP 715,400, 734,276 and 726,933, with (b) a di- or tri-alkylamine or a di- or tri-alkylolamine, are good lubricants and antistatic agents for nylon, Terylene, etc. C.O.C.

### Antistatic Lubricant for Viscose and Acetate Rayon

American Cyanamid

USP 2,738,324

A mixture of (1) dodecyl toluene sodium sulphate (2) an ammonium and/or sodium salt of a branched-chain dioctyl sulphosuccinate, (3) an ammonium and/or sodium salt of a branched chain dinonylsulphosuccinate, (4) an ammonium and/or sodium salt of a branched-chain didecylsulphosuccinate, and (5) a low viscosity oil, is self emulsifying and useful as an antistatic lubricant for viscose and acetate rayons. C.O.C.

### Plasticisers for Coating Compositions for Fabrics

ICI

BP 775,878

A flexible coating is given by applying a polyhydric alcohol-polybasic acid condensate, an organic polyisocyanate and, as plasticiser, a mixed polyester different from the condensate and then heating. The polyester is a liquid of mol. wt.  $< 500$  and is obtained by condensing a glycol with an aliphatic dicarboxylic acid and/or an aromatic monocarboxylic acid.

BP 775,879

The above composition is especially applicable to heavy-weight polyester fibre fabrics. C.O.C.

Zirconium as a Drier (V p. 479)

Gas Fading Inhibitors for Inclusion in Spinning Solutions (VI p. 481)

## IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

### Dyemaking Works of Perkin & Sons

W. H. Cliffe

#### Some Hitherto Unrecorded Details

J.S.D.C., 73, 312-318 (July 1957)

Although the works of Perkin & Sons at Greenford Green are now part of industrial history, little is known of them today. Some details which have recently come to light are not without interest and are now recorded for the first time.

#### Pacta Conventa—The Last Days of Perkin & Sons

*Ibid.*, 318-322

A study of the private papers of the late Sir William Perkin has enabled the first public account to be written of the terms of the sale of Perkin & Sons' Greenford Green works to Brooke, Simpson & Spiller. It is based largely on statements made in 1874 by Thomas Dix Perkin.

#### Litera Scripta Manet—The Alizarin D  b  cle

*Ibid.*, 323-328

After Brooke, Simpson & Spiller purchased the business of Perkin & Sons they failed to realise their expectations in the alizarin field and eventually gave up the attempt. How they unavailingly tried to impose responsibility for their failure on W. H. Perkin and T. D. Perkin, even to the extent of recourse to law, is now recorded for the first time.

AUTHOR

### Molecular Polarisation and Molecular Interaction. VI—Apparent Dipole Moments of *m*- and *p*-Nitroaniline, *m*- and *p*-Bromoaniline, and *p*-Toluidine in Benzene and Dioxan Solutions

J. W. Smith and S. M. Walshaw

J.C.S., 3217-3222 (July 1957)

#### 2-Nitro-1-naphthoic Acid

R. D. Topsom and J. Vaughan

J.C.S., 2842-2843 (June 1957)

2-Nitro-1-naphthaldehyde and 2-nitro-1-naphthoic acid, previously unreported, have been prepared from 2-nitro-1-methylnaphthalene via 2-nitro-1-naphthylpyruvic acid. A commercial "pure" grade of 1-methylnaphthalene on direct bromination gave an almost theoretical yield of 4-bromo deriv., which on nitration and subsequent debromination afforded 1-methyl-2-nitronaphthalene and thence 2-nitro-1-naphthylpyruvic acid. H.H.H.

### Ultraviolet Absorption Spectra of Nitro-substituted Aromatic Carbonyl Compounds

E. A. Walker and J. R. Young

J.C.S., 2041-2045 (May 1957)

The ultraviolet absorption spectra of mononitro-substituted benzaldehydes, acetophenones, and *trans*-chalcones, and of five dinitrochalcones are reported. *ortho*-Substituents show steric effects as described by Braude and Sandheimer (J.C.S., 3754 (1955)), and mononitrochalcones exhibit electronic substituent effects consistent with the findings of Black and Lutz (J. Amer. Chem. Soc., 77, 5134 (1955)). There are indications of a specific chromophoric effect from *m*- and *p*-nitrobenzoyl groupings. H.H.H.

### 7-Nitro-1-naphthylamine. II—Nitration of *N*-Acyl Derivatives and Decompositions of Diazotised 2:4:6-Trinitro-1-naphthylamines

A. Hardy and E. R. Ward

J.C.S., 2634-2640 (June 1957)

Nitration of three *N*-acyl-7-nitro-1-naphthylamines is described, the predominant mononitration of the toluene-*p*-sulphonyl deriv. in the 2-position being noteworthy. Decompositions of diazotised 2:4:7-trinitro-1-naphthylamine, compared with those of other diazotised 2:4:6-trinitro-1-naphthylamines, indicate the decisive influence of internuclear effects on their reactivity. 1:4:6-Trinitro-naphthalene is prepared for the first time, and further nitrates to give 1:3:5:8-tetranitronaphthalene only. H.H.H.

### Amine Oxidation. I—Side-chain Oxidation of *N*-Alkyl- and *NN*-Dialkyl-anilines by Manganese Dioxide

H. B. Henbest and A. Thomas

J.C.S., 3032-3039 (July 1957)

Alkyl- and dialkyl-anilines are oxidised by manganese dioxide at room temp. in  $\text{CHCl}_3$ , the three reactions discerned being (a) amide formation, (b) dealkylation with

production of an aliphatic aldehyde, and (c) dehydrogenation followed by oxidative cleavage of the resultant enamine. Conversions (a) and (b) are the major routes for the oxidation of dimethyl- and diethyl-aniline respectively, and ethylmethylaniline follows both routes. The oxidising power of solid manganese dioxide is found to vary with the reaction under examination. H.H.H.

### Spectroscopic Studies. I—2:4-Dinitrophenylhydrazones in Neutral and in Alkaline Solutions

C. J. Timmons

J.C.S., 2613-2623 (June 1957)

The absorption spectra of 96 representative 2:4-dinitrophenylhydrazones are classified for all the bands in various neutral and alkaline soln. In general four absorption bands are shown in neutral solvents, two at shorter wavelengths than the main max. and one at longer wavelengths, but these are not always all resolved as discrete bands, owing to considerable overlap. In the presence of alkali, the four bands are all shifted towards longer wavelengths. Qual. the colour in alkaline soln. gives a rough indication of the conjugation present, although the blue colour is found to be not specific (cf. Strain, J. Amer. Chem. Soc., 57, 758 (1935)) for bis-deriv. of  $\alpha$ -diketones, but is shown by all deriv. giving particularly stable anions. The charge-transfer spectra of the ions are complementary to the charge-resonance spectra of the neutral mol. in correlating spectra with the structures of the parent carbonyl cpd. Solvent shifts, including those due to hydrogen-bonding and  $\pi$ -complex interaction, are discussed. Further cases are reported of the formation of 2:4-dinitrophenylhydrazones in pyridine soln. H.H.H.

### Oxidation of Phenylhydrazine

R. L. Hardie and R. H. Thomson

J.C.S., 2512-2518 (June 1957)

The oxidations of phenylhydrazine in the aromatic solvents benzene, toluene, isopropylbenzene, nitrobenzene, chloro- and bromo-benzene, anisole, and pyridine are described, and a new method of phenylation is thereby discovered, viz. the oxidation of phenylhydrazine with metallic oxides (preferably silver) in an aromatic solvent. Phenyl radicals are the active species. Similar reactions have been effected with *p*-bromophenyl-, *p*-nitrophenyl-, 2:4-dinitrophenyl-, and 2-naphthyl-hydrazine in benzene and with *p*-nitrophenylhydrazine in thiophene soln. Diaryls are also formed by the oxidation of phenylhydrazine with air, and with benzoquinones, in aromatic solvents, and with  $\text{Ag}_2\text{O}$  and  $\text{CuSO}_4$  in aq. media. H.H.H.

### Kinetics of the Rearrangement and Oxidation of Hydrazobenzene in Solution

D. A. Blackadder and C. Hinshelwood

#### I—Rearrangement and Spontaneous Oxidation

J.C.S., 2898-2903 (July 1957)

The rearrangement of hydrazobenzene (I) in acid soln. and its oxidation in alkaline soln. containing oxygen are complementary, in that the former involves protonation whereas the latter proceeds by deprotonation. The rearrangement is of the first order with respect to I and of the second order with respect to acid. This is interpreted in terms of a rate-determining transformation, caused by the approach of a second proton of a monoprotanated species. The oxidation of I by dissolved mol. oxygen in catalyst free soln. is a spontaneous reaction of the first order with respect to I. The rate of the reaction, in contrast with that of the rearrangement, decreases as the hydron concn. increases, and is independent of the oxygen concn. once a certain critical value has been exceeded. These facts lead to a mechanism having as its rate-determining stage the second ionisation of I to give a doubly charged negative ion, readily oxidised. H.H.H.

#### II—Catalysed Oxidation

*Ibid.*, 2904-2906

The mechanism of the catalysed oxidation of hydrazobenzene (I) in alkaline soln. containing  $\text{O}_2$  by cupric ions, involves the rate-determining acceptance of one electron by cupric ions from a substrate consisting of singly charged ions produced by the first (acid) dissociation of I. The reaction rate is independent of the  $\text{O}_2$  concn. once a certain critical value is exceeded, and a similar limit is reached on increasing the concn. of the catalyst. The latter behaviour, coupled with the dependence of rate on pH, leads to the

conclusion that the catalyst is a colloidal soln. of cupric hydroxide, which enters into an oxidation-reduction cycle. Cupric ions were 10 times as effective as those of any other metal tried. H.H.H.

#### Mechanism of the Coupling of Diazonium Salts with Heterocyclic Compounds. II—Reaction of the Neutral Indole Molecule

J. H. Binks and J. H. Ridd

*J.C.S.*, 2398–2402 (May 1957)

The kinetics of the reaction of diazonium ions with excess of indole in very dil. aq. soln. appear to be due to the superposition of two reactions, a normal azo coupling and an auto-catalytic side reaction that removes diazonium ions without formation of an azo epd. Over the pH range 4–6, the kinetics of the azo coupling suggest that substitution occurs directly into the neutral indole mol., and not by previous formation of the conjugate base. No deuterium isotope effect was observed. H.H.H.

#### 4:4'-Diamidinoazobenzenes

J. N. Ashley and S. S. Berg

*J.C.S.*, 3089–3093 (July 1957)

The preparations of 4:4'-diamidino-azoxybenzene, -hydrazobenzene, and -diazo-*N*-methylaminobenzene are described. H.H.H.

#### Polyazobenzenes. III—Infrared Absorption Spectra of Some Polyazobenzenes

K. Veno

*J. Amer. Chem. Soc.*, 79, 3205–3208 (20 June 1957)

The infrared absorption frequencies from 4000 to 650  $\text{cm}^{-1}$  are given of 17 polyazobenzenes and their nitro, amino, and hydroxy derivatives. Frequencies are assigned in most cases to bond or group vibrations, and the results are discussed in relation to the structures of the dyes. C.O.C.

#### Disperse Thiazole Azo Dyes

L. Pentimalli

*Chim. e Ind. (Milan)*, 39, 7–14 (1957)

*Chem. Abs.*, 51, 7013 (10 May 1957)

Disperse azo dyes were made by diazotising amines such as *p*-nitroaniline, 2-aminothiazole, 2-aminobenzthiazole, and 2-amino- $\alpha$  (and  $\beta$ )-naphthothiazole, and coupling with various *N*-substituted 2-amino- $\beta$ -naphthothiazoles, and with 2:4-dihydroxyquinoline. E.S.

#### Aromatic Arylalkylation. I—Triphenylmethylation of *o*-Cresol in Sulphuric Acid-Acetic Acid

T. G. Bonner, J. M. Clayton, and (the late) G. Williams

*J.C.S.*, 2867–2872 (July 1957)

Rates of reaction and the extent of ionisation of the alcohol over a wide range of media indicate that the reaction between triphenylmethanol and *o*-cresol in sulphuric-acetic acid to form 4-hydroxy-3-methylphenyl-triphenylmethane takes place through the electrophilic attack of the  $(\text{C}_6\text{H}_5)_3\text{C}^+$  ion— $(\text{C}_6\text{H}_5)_3\text{C}^+ + \text{C}_6\text{H}_4(\text{CH}_3)\text{OH} \rightarrow (\text{C}_6\text{H}_5)_3\text{C}-\text{C}_6\text{H}_4(\text{CH}_3)\text{OH} + \text{H}^+$ . The nature of the coloured epd. which is immediately formed on mixing the reactants is discussed. H.H.H.

#### Quinones. VI—Some New Polyhydroxynaphthaquinones

J. F. Garden and R. H. Thomson

*J.C.S.*, 2483–2489 (June 1957)

The syntheses of 5:6- and 5:7-dihydroxy- and 2:3:5- and 2:3:6-trihydroxy-1:4-naphthaquinones are described. Simple 2-hydroxy-1:4-naphthaquinones form red soln. in aq. NaOH, but this colour is found to shift usually towards orange-yellow when a *peri*-methoxyl group is introduced; the effect is more striking when two such groups are present. Certain substituents attached to a quinone ring, e.g. halogen or alkylthio groups, are readily replaced by hydroxyl on treatment with alkali, but a second hydroxyl group cannot be introduced adjacent to the first in this way. H.H.H.

#### Anthraquinone Compounds—Dyes for Cellulose Acetate

Ko Naiki

#### IV—*N*-2-Hydroxyethyl Derivatives of 1:4-Diamino-2-methoxyanthraquinone and 1:4-Diamino-2-methylanthraquinone

*J. Soc. Org. Synthet. Chem., Japan*, 12, 108–111 (1954)

Preparations, melting points, and maximum absorption wavelengths are given. Dyeing affinities and washing fastnesses of the products are compared.

#### V—1:4-Diamino-2-alkoxyanthraquinones

*Ibid.*, 185–189

Produced by treating 1:4-diamino-2-hydroxyanthraquinone with alkyl *p*-toluenesulphonates in acetone and 10% NaOH solution; m.p., etc. are given.

#### VI—1-Alkylamino-4-hydroxy- and 1:4-Bisalkylaminoanthraquinones

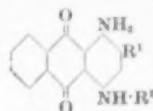
*Ibid.*, 364–367

1-Alkylamino-4-bromoanthraquinones are heated with  $\text{H}_2\text{SO}_4$  and boric acid, or leucoquinizarin (1 mol.) is condensed in alcohol with alkylamines (1 mol. or 2 mol.), and the product is oxidised with nitrobenzene; m.p., etc. are given.

#### VII—2-Substituted Derivatives of 1-Amino-4-alkylaminoanthraquinones

*Ibid.*, 401–405

Data on m.p., maximum absorption wavelength, and effects of changes in  $\text{R}^1$  and  $\text{R}^2$  on colour, light and washing fastness, and dyeing affinity are given for 12 compounds of formula—



( $\text{R}^1 = \text{H}, \text{CH}_3, \text{O}-\text{CH}_3$ , or  $\text{Br}$ ;  $\text{R}^2 = \text{H}, \text{CH}_3$ , or  $\text{C}_2\text{H}_5\text{OH}$ ). E.T.

#### VIII and IX—Synthesis of Hydroxytrichloroanthraquinones and their Amination Products

#### X—Re-examination of the Conditions for the Synthesis of 1-Hydroxy-4-chloroanthraquinone and Synthesis of Aminoanthraquinone Derivatives from this Compound

*Ibid.*, 13, 72–78 (1955)

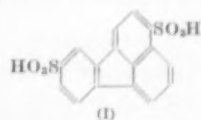
*Chem. Abs.*, 51, 721 (10 Jan.) and 1610 (25 Jan. 1957)  
Dichlorophthalic anhydrides are condensed with chloro- and hydroxychloro-benzenes to give the corresponding benzoylbenzoic acids, which are then converted to tetra-substituted hydroxychloroanthraquinones. Methods for preparing derivatives of these intermediate anthraquinone compounds are given along with melting points of the final purified products. Phthalic anhydride and *p*-chlorophenol are condensed to give 1-hydroxy-4-chloroanthraquinone, and the preparation of derived disubstituted products is discussed. Figures for absorption spectra in ethanol are given, and the fastness of these derivatives suitable for dyeing cellulose acetate is discussed. E.T.

#### Orientation of Fluoranthene-4:12-disulphonic Acid

T. Holbro and N. Campbell

*J.C.S.*, 2652–2653 (June 1957)

The syntheses of fluoranthene-4:11- and -4:12-disulphonamide (I) are described, and the latter found to be identical with the anilide from the disulphonation product from fluoranthene, which is thus fluoranthene-4:12-disulphonic acid.



H.H.H.

#### Colour and Constitution. II—Effect of the Common Monatomic Substituents on the Ultraviolet Spectrum of Alternant Hydrocarbons

D. Peters

*J.C.S.*, 1993–1998 (May 1957)

The Hückel L.C.A.O. molecular-orbital theory is shown to provide a quant. account of the bathochromic shifts observed in the ultraviolet spectrum of the alternant hydrocarbons, naphthalene, anthracene, 1:2-benzanthracene, phenanthrene, pyrene, and chrysene, on the introduction of the common monatomic substituents hydroxyl, methoxyl, amino, and the halogens, which contribute one *p* orbital to the mesomeric system of the hydrocarbon. The methoxy seem slightly larger than the hydroxy shifts, the amino often cause very large shifts with severe distortion of the fine structure of the *p* band, while halogen substituents cause rather small ones with good retention of the fine structure of the *p* band. H.H.H.

## Conjugated Macrocycles

## XXIX—Tribenzotetrazaporphin Metal Derivatives and Dibromotribenzotetrazaporphin

J. A. Elvidge, J. H. Golden, and R. P. Linstead

J.C.S., 2466-2472 (June 1957)

The method (cf. J.C.S., 3536 (1955)) for the preparation and purification of tribenzotetrazaporphin (I) is considerably improved, and monobenzotetrazaporphin tentatively identified as a contaminant. Cu, Ni, and Co deriv. of I are described, and a dibromo product is reported which yields phthalimide and dibromomaleimide on oxidation. Light absorptions are included and discussed.

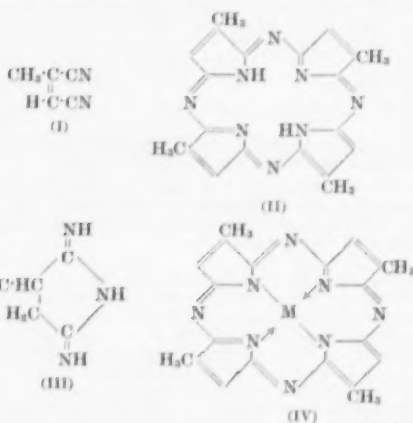
H.H.H.

## XXX—Tetramethyltetrazaporphin

P. M. Brown, D. B. Spiers, and M. Whalley

Ibid., 2882-2888 (July 1957)

Methylmaleinitrile (citraconitrile) (I) is prepared in good yield (for the first time) and converted into a tetramethyltetrazaporphin (II), which has also been obtained from methylsuccinimide (III). Metal deriv. (IV: M = Mg, Cu, or Ni) are prepared from II, which has also been degraded to citraconitrile. Light absorptions are given.

Isolation and Constitution of Mollisacacidin, a New leucoAnthocyanidin from the Heartwood of *Acacia Mollissima* Willd.

H. H. Keppler

J.C.S., 2721-2724 (June 1957)

The isolation of the title substance from black wattle heartwood is described, and its structure tentatively established by oxidation as *cis*-3:4:7:3':4'-pentahydroxy-flavan; this is confirmed by reduction of fustin (isolated from the heartwood of *Rhus glabra*) to mollisacacidin. The natural and synthetic leuco-anthocyanidin both give fisetinidin chloride on treatment with mineral acid.

H.H.H.

## PATENTS

## Bromination of Amino-anthraquinones

General Aniline

BP 781,258

1-Amino-, 1:4-, 1:5- and 1:8-diamino-anthraquinones are brominated in nitrobenzene at 7-12°C. or 75-150°C. to give products in high yield and of excellent quality. Bromination at temperatures between these ranges yields mixtures of isomers.

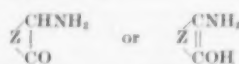
E.T.

## Colour Developers

Agfa AG für Photofabrikation

BP 778,657

Compounds of formula—



(Z = atoms to complete a nitrogenous heterocyclic ring) are excellent colour developers. Thus a photographic layer containing 4-stearoylamino-benzoylacetanilide-3':5'-dicarboxylic acid when developed with the methanesulphonylhydrazide of 1-phenyl-4-aminopyrazolone-3-carboxylic acid hydrachloride yields an intensely yellow dye image.

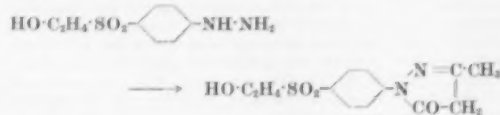
C.O.C.

## Yellow and Orange Acid and Metachrome Monoazo Dyes of the Pyrazolone and Aminopyrazole Series

FH

BP 776,265

Aromatic diazo compounds are coupled with 5-pyrazolones or 5-aminopyrazoles containing a  $\text{CH}_2$  or carbalkoxy group in the 3-position, and in the 1-position a phenyl radical carrying as substituent the group  $\text{SO}_3\text{CH}_2\text{CH}_2$  or  $\text{SO}_3\text{CH}_2\text{CH}_2\text{O}\text{SO}_3\text{H}$ . Thus *p*- $\beta$ -hydroxy-ethylsulphonylaniline is converted into the corresponding hydrazine, and reacted with diketene or ethyl acetoacetate to give the pyrazolone, thus



The hydroxy group is treated with  $\text{H}_2\text{SO}_4$  to give the sulphuric ester, which is coupled in alkaline soln. with diazotised anthranilic acid. The monoazo dye is a yellow metachrome dye.

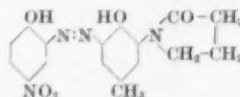
E.S.

## Metallisable Monoazo Dyes for Wool, Nylon, etc., having a Pyrrolidonyl Group

FBY

BP 776,318

Suitable *o*-aminophenols are diazotised and coupled with 4-alkyl-2-*N*-pyrrolidonylphenols to give monoazo dyes which may be metallised in substance, on the fibre, or in the dyebath. The coupling components are made by condensing 4( $\text{C}_1\text{--C}_4$ )-alkyl-2-aminophenols with  $\gamma$ -butyrolactone. Thus 2-amino-4-nitrophenol is diazotised and coupled with 4-methyl-2-*N*-pyrrolidonylphenol in presence of NaOH and pyridine. The monoazo compound formed—



is a reddish brown metachrome dye.

E.S.

## Metal(Cobalt)-complex Monoazo Dyes for Wool, Nylon, etc.

Ciba

BP 778,718

The 1:2 cobalt complexes of monoazo dyes *o*-aminophenol- $\rightarrow$ *N*-subst. sulphonamide of  $\beta$ -naphthol dye wool, nylon, etc. from neutral or weakly acid baths. Thus the monoazo compound 2-aminophenol-4-sulphonamide- $\rightarrow$ 2-naphthol-6-sulphonamide is dissolved in aq. NaOH and stirred at 80°C. with  $\text{CoSO}_4$  to give the metal complex which dyes wool bordeaux.

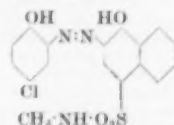
E.S.

## Red, Metal(Chromium and Cobalt)-complex Monoazo Dyes for Wool, Nylon, etc.

Ciba

BP 777,050

Diazotised *ortho*-aminophenols are coupled with *ortho*-coupling 1-naphthol-sulphon-*N*-subst. amides or -sulphonic acid aryl esters, and the monoazo compounds so formed are converted into their 1:2 chromium, or preferably, cobalt complexes, to give reds and bordeaux applicable to wool, nylon, etc. from neutral or weakly acid baths. Thus 2-amino-4-chlorophenol is diazotised and coupled with 1-naphthol-4-sulphon-*N*-methylamide in presence of  $\text{Na}_2\text{CO}_3$ . The monoazo compound so formed



is stirred 30 min. at 80°C. with  $\text{CoSO}_4$  to give a bordeaux.

E.S.

## Metal-complex Monoazo Dyes for Wool, Nylon, etc.

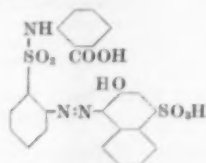
Gy

BP 778,262

Amides of orthanilic acid substituted at the *N* atom of the sulphonamide group by an Alk or Ar group which contains a group capable of chelation are diazotised and coupled with *ortho*-coupling hydroxy-compounds, and the monoazo compounds so formed are made into 1:1 metal complexes, especially with Cr. If the coupling component contains a sulpho group the products dye wool, nylon, etc.



from a strongly acid bath; if no sulphonyl group is present a neutral or weakly acid bath is suitable. Thus 2-nitrobenzenesulphonyl chloride is condensed with anthranilic acid, and the product reduced with iron powder to give the amine, which is diazotised and coupled with 2-naphthol-4-sulphonic acid, giving



Boiling with a basic chromium sulphate gives the 1:1 Cr complex which dyes wool bluish red from a sulphuric acid bath. E.S.

#### Azo Dyes Containing Sulphonyl Chloride Groups; Metal-complexes of Sulphonamides Derived Therefrom

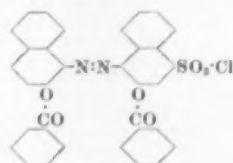
Ciba

BP 779,880

*oo'*-Dihydroxyazo compounds containing 1 or 2  $\text{SO}_2\text{H}$  groups are *O*-acylated and then treated with phosphorus chlorides to give the sulphonyl chlorides, which may be reacted with ammonia or amines to give sulphonamides, or with phenols, etc., to give sulphonate esters.

BP 779,879

The azosulphonamides described above are converted into 1:2 metal:dye complexes with Cr or Co compounds, with splitting of the *O*-acyl groups, to give dyes applicable to wool from neutral or weakly acid baths. Thus the monoazo compound 1-amino-2-naphthol-4-sulphonic acid  $\rightarrow$   $\beta$ -naphthol is stirred in pyridine at 40–50°C. with benzoyl chloride, and the *O*-benzoyl compound formed is treated in chlorobenzene with  $\text{PCl}_5$  to give the sulphonyl chloride



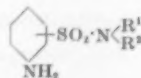
This is stirred in chlorobenzene with 25% aq. ammonia at 80–90°C. to give the sulphonamide, which is boiled with aq. sodium chromosalicylate to give the metal-complex which dyes wool blue. E.S.

#### Yellow Monoazo Pigments

FH

BP 778,131

Sulphanilamides



(the benzene ring contains at least one  $\text{CH}_3$ , *O*-Alk, *O*-Ar, Cl, or aralkoxy;  $\text{R}^1$  and  $\text{R}^2$  = Ar, cycloalkyl, or aralkyl, or Alk which are together of  $> 4$  C and may be connected to give a heterocyclic ring) are diazotised and coupled with acylacetarilides



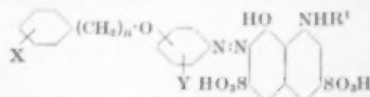
( $\text{R}^3$  = Alk or Ar; X = Alk or *O*-Alk; Y = *O*-Alk or Hal; Z = Alk, *O*-Alk, or Hal; provided that when X = *O*-Alk, Y = Hal and Z = Alk or *O*-Alk or Y = *O*-Alk and Z = Hal; and that when X = Alk, Y = Hal and Z = *O*-Alk) to give yellow pigments of good light fastness. Thus 2-aminoisole-4-sulphondi-*n*-butylamide is diazotised and coupled with an aq. suspension of acetacet-2:5-dimethoxy-4-chloranilide. The product colours cellulose ester lacquers vivid yellow. E.S.

#### Magenta Dye Images in Silver-Dye-Bleach Colour Photography

Gy

BP 779,615

A magenta dye of formula—



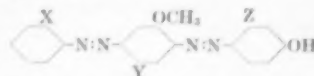
( $n = 0$  or 1; X and Y = H or substituent which does not confer solubility in water;  $\text{R}^1$  =  $\text{COR}^2$ ,  $\text{COOR}^2$  or  $\text{SO}_2\text{R}^2$  ( $\text{R}^2$  = subst. or unsubst. hydrocarbon or a hydrocarbon containing O atoms linking different hydrocarbon units containing  $> 1$  C;  $\text{R}^1$  + X or Y contain  $> 11$  C; at least one of X, Y and  $\text{R}^1$  contain an end group which is either wholly hydrocarbon or a halogenated hydrocarbon of  $> 3$  C) used in a photographic silver emulsion is readily bleached when the silver image is oxidised. C.O.C.

#### Yellow, Orange, and Red Disazo Disperse Dyes

S

BP 776,268

The introduction of methoxy groups into disperse dyes of the type aminoazobenzene- $\rightarrow$ -phenol gives yellow, orange and red disperse dyes



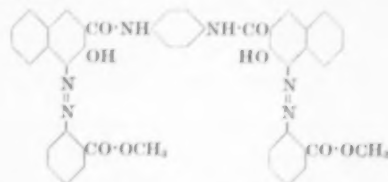
(Y =  $\text{CH}_3$  or  $\text{OCH}_3$ ; X and Z = H or  $\text{OCH}_3$ , but may not both = H). If X =  $\text{OCH}_3$  and Z = H yellow dyes of good dyeing properties are produced, and when Z =  $\text{OCH}_3$ , the products are reds particularly suitable for nylon. Thus *o*-anisidine- $\rightarrow$ -*p*-cresidine- $\rightarrow$ -phenol is a yellow-orange, and *p*-anisidine- $\rightarrow$ -2:5-dimethoxyaniline- $\rightarrow$ -*m*-methoxyphenol is a bluish red. E.S.

#### Disazo Pigments for Polyvinyl Compounds, etc.

Ciba

BP 780,031

An ester of an aniline-*o*-carboxylic acid is diazotised and coupled with 3:2-hydroxynaphthoic acid, or other hydroxy-carboxylic acid, and the resulting carboxymonoazo compound is converted into its acid chloride, 2 mol. of which are then condensed with 1 mol. of a primary or sec. diamine. The products are pigments particularly suitable for incorporating into polyvinyl chloride. Thus the monoazo compound methyl anthranilate- $\rightarrow$ -3:2-hydroxy-naphthoic acid is boiled with  $\text{SOCl}_2$  in chlorobenzene to give the acid chloride, which is boiled in chlorobenzene with *p*-phenylenediamine in presence of pyridine to give the disazo pigment



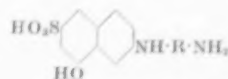
which gives red-brown when incorporated by rolling into polyvinyl chloride foils. E.S.

#### Metallisable Trisazo Direct Dyes

Ciba

BP 777,200

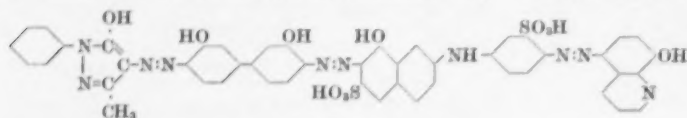
Diphenyl derivatives having in the 3:3' positions  $\text{COOH}$ ,  $\text{OCH}_2\text{COOH}$ , or preferably, OH groups are tetrazotised and coupled with 1 mol. of a suitable ketomethylene compound and with 1 mol. of an *N*-substituted- $\gamma$  acid



( $\text{R}\cdot\text{NH}_2$  = *p*-amino compound of the benzene or diphenyl series and contains an  $\text{SO}_2\text{H}$  group), the  $\text{NH}_2$  group of which is finally diazotised and coupled with an 8-hydroxy-quinoline. The products are mainly navy blue direct dyes which may be metallised, especially with copper compounds, in substance, on the fibre, or in the dyebath. Thus



3:3'-dihydroxybenzidine is tetrazotised and coupled in presence of  $\text{Na}_2\text{CO}_3$  first with 1 mol. of *N*-4-amino-3-sulphophenyl- $\gamma$  acid and then with 1 mol. of 3-methyl-1-phenyl-5-pyrazolone. The aminodisazo compound so formed is diazotised and coupled with 8-hydroxyquinoline to give

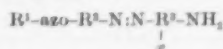


which dyes cotton navy blue by the single- or two-bath aftercoppering process. E.S.

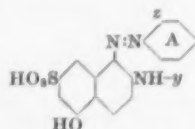
#### Grey, Metallisable Tetrakisazo Direct Dyes

BP 776,711

Aminodisazo compounds—



( $\text{R}^1$ ,  $\text{R}^2$ , and  $\text{R}^3$  = Ar of benzene or naphthalene series and may contain common substituents;  $x = \text{OCH}_3$  or  $\text{OC}_2\text{H}_5$  and is *ortho* to the  $\text{NH}_2$  group; *azo*- and  $\text{-NH}_2$  are *para* to the  $\text{-N:N-}$  group) are diazotised and coupled with 1 mol. of an azo compound—

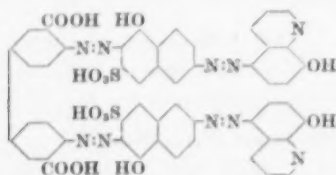


( $y$  = Alk, cycloalkyl, Ar, or aralkyl;  $z$  = OH or  $\text{COOH}$ ; the ring A may have common substituents), or a metal complex thereof, to give grey direct dyes which may be metallised, especially with Cu, in substance, on the fibre, or in the dyebath. Thus the aminodisazo compound metanilic acid  $\rightarrow$  1-naphthylamine-7-sulphonic acid  $\rightarrow$  *p*-cresidine is diazotised and coupled with the acid-coupled monoazo compound 2-aminophenol-4-sulphonamide  $\rightarrow$  *N*-phenyl-J acid in presence of pyridine and ammonia. E.S.

#### Metallisable Tetrakisazo Direct Dyes

Ciba BP 778,233

Symmetrical tetrakisazo dyes are made by coupling tetrazotised 3:3'-dicarboxy (or dicarboxymethoxy) - benzidine with 2 mol. of a suitable aminonaphtholsulphonic acid (e.g. J or  $\gamma$  acid), tetrazotising the diaminodisazo compound so formed, and coupling with 2 mol. of 8-hydroxyquinoline (I). They may be metallised (especially coppered) in substance, in the dyebath, or on the fibre. Thus tetrazotised benzidine-3:3'-dicarboxylic acid is coupled with 2 mol. of J acid in presence of  $\text{Na}_2\text{CO}_3$ , and the product is tetrazotised and coupled with 2 mol. of I, giving—



which dyes cotton navy blue by the single- or two-bath aftercoppering method. E.S.

#### Azo Pigments of Soft Grain

FH BP 778,806

Insoluble azo pigments of soft grain are made by adding during coupling an emulsion of oil in a condensation product of an alkylsulphonamide of high mol. wt. with a halogenarboxylic acid, so that the dry pigment contains 10–25% of oil. Thus a mixture of aliphatic hydrocarbons of boiling range  $150^\circ\text{C}$ . to  $350^\circ\text{C}$ . is reacted with  $\text{SO}_2$  and  $\text{Cl}_2$  to give the sulphonchloride, which is converted to the amide by condensation with ammonia or a primary amine. The amide is then condensed with e.g. chloroacetic acid. A mixture of mineral oil (75) in such a condensation product (23.5), in the form of a 10% aq. emulsion, is added to a

coupling soln. containing 3-methyl-1-phenyl-5-pyrazolone (216) and 3-carbethoxy-1-phenyl-5-pyrazolone (6), together with chalk. A tetrazo soln. from 3:3'-dichlorobenzidine (153) is then added at  $25^\circ\text{C}$ . After acidification and boiling, the pigment is filtered off and dried at  $60^\circ\text{C}$ . It contains

12–17% of oil and is of higher colour strength, softer grain, and higher bulk density than the same product prepared without addition of oil and emulsifying agent. E.S.

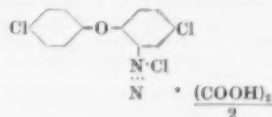
#### Stable Solid Diazonium Double

Salts with Oxalic Acid

FH BP 778,917

Oxalic acid combines with diazoazo compounds, to give crystalline compounds of good solubility and stability. Thus the aminoazo compound *p*-nitroaniline  $\rightarrow$  2:5-dimethoxyaniline is diazotised, and the soln. so formed mixed with aq. potassium oxalate. By cooling to  $15^\circ\text{C}$ . and slowly adding salt the diazonium oxalate-oxalic acid addition compound separates as brown crystals. BP 770,389

In a similar way the diazonium chloride prepared from 2-amino-4:4'-dichlorodiphenyl gives a stable crystalline addition compound with oxalic acid—



E.S.

#### Manufacture of Diazoamino Compounds in Dry Form

Ciba BP 780,266

When preparing diazoamino compounds which readily regenerate the diazo compound on the fibre under neutral conditions, the combination between the diazo compound and the *o*-carboxyaniline compound used as "stabiliser" is often far from complete. If however the reaction mixture is dried rapidly, e.g. spray-dried, a dry product is obtained in satisfactory yield. Thus diazotised 4-chloro-2-amino-anisole is mixed with a slightly alkaline soln. of *o*-carboxy-phenylaminoacetic acid, and aq. NaOH is added dropwise to maintain the pH at 9–10.5. After screening, the soln. is spray dried at an inlet temperature of  $140\text{--}180^\circ\text{C}$ ., outlet temperature  $80\text{--}100^\circ\text{C}$ . The yield is 85–90% of an orange powder of good solubility. E.S.

#### Phthalocyanine Pigments which do not flocculate in Organic Solvents

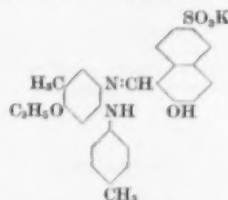
Gy BP 781,239

Pigments stable in lacquer solvents are produced when 80–98% of halogen free or not more than dihalogenated, metal-free phthalocyanines or those containing metals of atomic number 27–29 are mixed with 20–22% of tin and/or aluminium and/or titanium and/or iron phthalocyanines. C.O.C.

#### Photographic Filter and Antihalation Dyes

General Aniline BP 779,926

Dyes produced from yellow Schiff's bases, e.g. the dye—



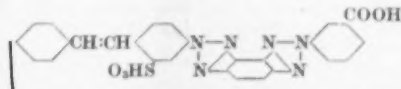
may be irreversibly discharged by the usual photographic bleaching agents, e.g. ferriyanide or acid bichromate, provided that the Schiff's bases are produced by condensing an *o*-hydroxyaldehyde of the benzene or naphthalene series with *o*-phenylenediamine in which one amino group is primary and the other is secondary. C.O.C.

#### Fluorescent Brightening Agents

Gy BP 779,505

A diazotised 4-aminostilbene-2-sulphonic acid or an aromatic diazo compound (1 mol.) is coupled with 1 mol.

of a *m*-diamino compound of the benzene series which can be coupled twice. The *o*-amino-monoazo dye obtained is oxidized to form the corresponding 5-amino-2-aryl-1:2:3-benzotriazole, coupled in the 4-position with another mol. of the diazonium compound and then oxidized to form the ditriazole compound. The components are so chosen that the aromatic radicals contain no chromophore and no aromatically bound OH or NH<sub>2</sub> groups. The products, e.g.—



have good affinity for cellulose, very slight self colour and greenish-blue fluorescence

BP 779,842

The solubility in water, substantivity, intensity of and colour of fluorescence of fluorescent derivatives of 4:4'-diaminostilbene are influenced not only by substitution of the aryl or triazinyl radicals but also by substitution of the stilbene radical. Thus 4:4'-bis-triazinylaminostilbene compounds, which, for optical reasons, contain the substituted amino groups in the triazinyl radical which increase solubility in water are more suitable for use in detergent liquids if they are derived from a 4:4'-diaminostilbene-2-monosulphonic acid than from a 4:4'-diaminostilbene-2:2'-disulphonic acid. This enables an *o*-position to the ethylene linkage of the stilbene radical to be occupied by an alkoxy group and so cause the greatest shift in the colour of the fluorescence from violet or blue towards green.

BP 779,958

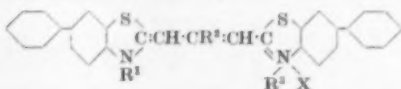
Modification of BP 779,505 (above). Greenish-blue fluorescing compounds substantive to cellulose are obtained if the 2-(stilbyl-4')-5-amino-1:2:3-benzotriazole-2'-sulphonic acids formed as intermediates are diazotised, coupled with an azo component coupling in the *o*-position to a primary amino group and then oxidized to form the ditriazole compound. C.O.C.

#### Carbocyanine Dyes

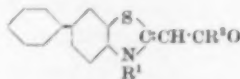
Kodak

BP 781,210

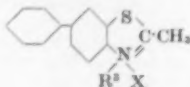
Dyes of formula—



(R<sup>1</sup> and R<sup>2</sup> = subst. or unsubst. Alk; R<sup>3</sup> = Ar; X = acid radical), e.g. 3:3'-dimethyl-6:6':9-triphenylthiacarbocyanine *p*-toluenesulphonate, have strong photographic sensitising properties. They are prepared by heating a compound of formula—



with a phosphorus oxyhalide and condensing the product with a compound of formula—



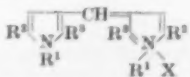
C.O.C.

#### Dipyrromethin Dyes

Kodak

BP 781,000

Dyes of formula—



(R<sup>1</sup> = carboxyalkyl; R<sup>2</sup> and R<sup>3</sup> = CH<sub>3</sub>, C<sub>2</sub>H<sub>5</sub> or C<sub>6</sub>H<sub>5</sub>; X = acid radical), e.g. bis(1-carboxymethyl-2:5-dimethyl-3-pyrrole)-methineyanine bisulphate, have better solubility than the dyes described in BP 691,694 (*J.S.D.C.*, 69, 306 (1953)) and are more readily bleached in alkaline photographic developing solutions. They are obtained by

condensing together two molecules of a compound of formula—



e.g. 1-carboxy-2:5-dimethylpyrrole in presence of excess of an orthoformic ester and an acid, e.g. ethyl orthoformate and H<sub>2</sub>SO<sub>4</sub>. C.O.C.

#### Ultramarine

Interchemical Corp.

USP 2,738,288

Clay of the normal type used in making ultramarine (C.I. Pigment Blue 29) is calcined for 1–3 hr. at 550–950°C. and is then digested with a caustic solution, e.g. 10% NaOH. The prepared clay is then mixed with sulphur and sodium sulphide and heated in a non-oxidising atmosphere for 20 min.–3 hr. at 750–900°C. The temperature is then reduced to 500–800°C. and the atmosphere changed to oxidising. After 30–180 min. under these conditions the material is cooled, washed and ground. C.O.C.

Monolayers. V—Formation of Monolayers by Sulphonated Azo Dyes on Water and Aqueous Solutions (VIII p. 481)

Dyeing and Printing Polyacrylonitrile Fibres (VIII p. 483)

## V—PAINTS; ENAMELS; INKS

PATENTS

#### Zirconium as a Drier

Carlisle Chemical Works

BP 781,449

Zirconium in absence of other driers behaves like a poor secondary drier but it boosts up the activity of primary driers to such an extent that up to 60% of Co or 80% of Mn can be replaced by Zr in maintaining the drying times of an identical system consisting only of Co and/or Mn, or Co + Pb or Co + Mn + Pb. Use of Zr also much improves the hardness and water-resistance of the coatings.

BP 781,450

2-Ethylhexoic acid derivatives of zirconylic acid have excellent drying properties and can replace to a considerable extent the Mn, Co and Pb driers. They can be used in large amounts in white paints without producing discoloration. C.O.C.

#### Fine Dispersions of Pigments in Organic Substances

Ciba

BP 780,316

Pigment dispersions suitable for direct incorporation into spinning solutions, lacquers, etc. are obtained by kneading and/or heating pigments in a roller mill in an organic medium of viscosity > 10 centipoises at 20°C. or in a melt of an organic substance which is solid at 20°C. in presence of > 20% (on wt. of the pigment) of a grinding body, e.g. NaCl, which is subsequently washed out. C.O.C.

#### Ink for Printing on Poly(halogenated Olefins)

M. W. Kellogg Co.

BP 778,727

The ink comprises a pigment and as binder either a normally solid copolymer of trifluorochloroethylene and vinylidene fluoride of softening point > 150°C. and soluble in oxygenated organic solvents or a liquid polymer of trifluorochloroethylene. The vehicle consists of a solution in an oxygenated organic solvent, e.g., tetrahydrofuran, a copolymer of a perfluorochloroolefin and another containing at least one hydrogen atom and more than one carbon atom and of softening point > 150°C. Prints made on poly(halogenated olefins) with this ink neither amudge, offset or chip. C.O.C.

#### Craze-resistant Methyl Methacrylate Lacquers

DuPont

BP 778,935

A liquid composition which on drying yields a hard, adherent, craze-resistant coating comprises a pigment, a polymer or copolymer of methyl methacrylate, a solvent and 1–50% (on wt. of non-volatile components) of organophilic cation-modified clay. The cation used is ammonium, phosphonium, oxonium, sulphonium, selenonium, stan-  
nomium, argonium, stibonium, telluronium or iridonium and contains at least one alkyl substituent of > 9 C.

C.O.C.

## VI—FIBRES; YARNS; FABRICS

### Swelling and Dissolution of Fibres

M. Sorkin

*Textil-Rund.*, 12, 249–258 (May), 323–333 (June 1957)

Tables showing behaviour under heat, swelling, solvent retention, and bulk densities are given. The solubilities of a wide range of fibres in various solvents are discussed and compared.

S.R.C.

### Infrared Spectrum of Cellulose

M. Tauboi

*J. Polymer Sci.*, 25, 159–171 (July 1957)

Infrared absorption spectra of oriented cellulose fibres have been obtained using polarised radiation. The dichroism observed for assignable bands is interpreted in terms of the crystal structure of cellulose. The CH stretching band is polarised perpendicular to the fibre axis. Nine bands are observed in the region of the CH and OH deformation frequencies, four being polarised parallel and five perpendicular to the fibre axis. Probable assignments for these bands are given. In the region of the CO and CC stretching frequencies all the bands are polarised parallel to the fibre axis. Observations have also been made on deuterated cellulose. Of six OD stretching bands observed five show parallel dichroism, indicating that OH bonds in cellulose are arranged predominantly parallel to the fibre axis.

W.R.M.

### Surface Structure of Wool Fibres

N. Ramanathan, J. Sikorski, and H. J. Woods

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 92–F 105, F 210–F 211 (1955)

Two methods of obtaining SiO replicas of wool fibre surfaces are described; both make use of a technique in which the fibre is partly embedded in a suitable plastic (polystyrene or celluloid) leaving only a fraction of the surface exposed. In one, a direct replica is obtained by evaporating SiO, which is freed from the fibre by dissolving the embedding material; in the other (two-stage technique), silver is used for the first replica, and is stripped from the fibre without disturbing it; a positive SiO replica is then made from the silver intermediate, and the silver dissolved in dilute acid. Both techniques yield replicas showing much more detail in the scale surfaces than has been reported. The two-stage technique lends itself to an experimental investigation of the reproducibility of replicas, and to the possibility of comparing the same surface area before and after some surface treatment; certain applications are described. Interpretation of the micrographs is facilitated by using stereoscopic methods, and in this way several new features of the cuticle have been observed. In an examination of Lincoln wool fibres the epicuticle is often observed to be torn at the scale tips; epicuticular welds or folds are found to run across the scale edges; and the individual scales are often bordered by a remarkable striated band. In general each scale tends to be broadly corrugated near its root ends and smoother towards its tips, whilst the whole surface is often traversed by a system of fine longitudinal striations.

P.G.M.

### Fine Histology of Wool

R. D. B. Fraser and G. E. Rogers

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 106–F 111, F 211–F 212 (1955)

The value of metal shadowing in optical microscopy for investigating the fine histology of wool is emphasised and examples of its application are described. The differential action of alkaline thioglycollate solutions on the ortho- and para-cortex in merino wool is shown to be largely due to the differing susceptibilities of the two types of cortical cell. Evidence is also presented for a line of fusion at the junction of neighbouring scales, and its relation to the fine histology of the cuticle is discussed.

P.G.M.

### Fine Histology of Wool

E. H. Mercer, J. L. Farrant, and A. L. G. Rees

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 120–F 129, F 213–F 216 (1955)

The results of the earlier electron microscopy of wool disintegrated by enzymatic digestion and/or chemical treatment are reviewed and shown to be largely confirmed by the more recently developed method of thin-sectioning. The typical non-medullated wool fibre consists of two kinds of cells, the external flattened cuticular cells and the

elongated cortical cells. Both varieties of cells retain their cell membranes, which are peculiar in being chemically resistant and electron-optically rather dense. The keratinised contents of the cortical cells consist of longitudinally aligned macrofibrils apparently cemented together within a matrix which appears to be rich in cystine residues. The cuticle cells contain a non-fibrous variety of keratin resembling the cement of the cortex. The fibrils of the cortex may be resolved into microfibrils (100–300 Å in diameter), thought to be the primary fibrous units. These microfibrils are nodulated, suggesting that they are aggregates of particles. The combined results of light and electron microscopy yield a coherent and fairly complete picture of the structure of the fibre down to the macromolecular level.

P.G.M.

### Microfibrillar Structure of Keratin Fibres

G. M. Jeffrey, J. Sikorski, and H. J. Woods

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 130–F 141, F 213–F 216 (1955)

The results of experiments in which keratin fibres were subjected to various chemical and physical disintegrative treatments indicate that there is, in general, a tendency for the breakdown to proceed by stages, the first being the separation of the keratin of the cortical cells into thin sheets or ribbons of microfibrils. These sheets subsequently disintegrate into the individual microfibrils, which are often so severely affected that they show a fine structure of a globular type. Separation of the microfibrillar sheets is best effected by treatments which break both the disulphide linkages and the hydrogen bonds. Oxidation of the –S–S– linkages appears to be more specific in its effects than reduction, which tends to have a general disintegrating effect on the microfibrils themselves as well as on the interfibrillar matrix, which is more specifically effected by oxidation. Globulation, however, is a common end effect of oxidation and reduction, and also of acid hydrolysis, provided that the treatments are sufficiently severe. The results suggest that there are differences in the reactivity of the –S–S– linkages at different histological levels, and that the interfibrillar material may be exceptionally rich in sulphur.

P.G.M.

### Keratin Fibre—Present State of the Ortho and Para Concept

J. H. Dusenbury and J. Menkart

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 142–F 150, F 217–F 219 (1955)

The development of the bilateral structure concept of the keratin-fibre cortex is reviewed; the implication of the recent observations that the ortho-cortex is dyed preferentially by both acid and basic dyes are discussed. Studies of four different fibre types indicate the following cortical structures: 64s Rambouillet—bilateral, ortho and para; human hair—para; kid mohair—ortho; B.A. fleeces wool—symmetrical, possibly ortho and para.

P.G.M.

### Bilateral Structure of Wool Cortex

R. D. B. Fraser and G. E. Rogers

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 151–F 155, F 219–F 220 (1955)

Recent investigations of the bilateral structure of the cortex in crimped wool are discussed in terms of histology, the nature of the chemical differences between the components, and the origin of the structure in the follicle. Coarse wools, in which crimp is much less, are shown to possess a radial asymmetry in which the peripheral cortical cells are less accessible to basic dyes and have a higher sulphur content than the central cells.

P.G.M.

### Separation of Cortical Cells of Two Types from Disintegrated Wool by means of Density-gradient Columns

H. P. Lundgren

*Proc. International Wool Textile Research Conf.*

*Australia*, F, F 200–F 204, F 224–F 225 (1955)

Cortical cells prepared from wool or mohair by treatment with acid or papain have been separated into two main fractions, differing in density and sulphur content, by stratification in an aqueous chloral hydrate density gradient. The composition of the fractions has been found to vary with the keratin used and with the reagent and time of treatment. The relation of these facts to the structure of the wool fibre is discussed.

P.G.M.

### Nomenclature Recommended to be used for the Two Segments or Types of Cortical Cells in Wool

*Proc. International Wool Textile Research Conf., Australia, F, F 225-F 226 (1955)*

After a discussion it was decided to favour the use of the terms *orthocortex* and *paracortex* for the two segments or types of cortical cells in wool. P.G.M.

### Physical and Chemical Properties of Pigmented Animal Fibres

G. Laxer and C. S. Whewell

*Proc. International Wool Textile Research Conf., Australia, F, F 186-F 199, F 222-F 224 (1955)*

Pigmented fibres have been shown to be more difficult to stretch and are more resistant to supercontraction in boiling sodium bisulphite solution than non-pigmented fibres. In crimped wool fibres the pigment is distributed asymmetrically across the fibre cross-section, the more heavily pigmented portion being found on the same side of the fibre axis as its centre of curvature, crossing over where the axis appears to have a point of inflexion. The unsymmetrical distribution of pigment in crimped wool is traced to the germinal layers of the bulb of the follicle which are well below the zone of keratinisation. Black-brown pigmented fibres absorb iron from ferrous sulphate solutions more rapidly and to a greater extent than white fibres, probably owing to the formation of a metal complex with the melanin of the pigment granules. Union between the iron and the fibre is reasonably firm and this bound iron is a useful catalyst for promoting bleaching when the iron-containing fibres are immersed in solutions of hydrogen peroxide. When only firmly bound iron is present, comparatively little damage occurs during the action of the peroxide even though the colour of black-brown fibres is changed to pale tan. P.G.M.

### Long-period Interferences in Synthetic Fibrous Materials

H. Rothe

*Faserforsch. und Textiltech., 8, 244-253 (June 1957)*

Small-angle X-ray studies of the polyamide of  $\epsilon$ -amino-caproic acid show, in addition to known long-period reflections, weaker interferences indicating periodicities, between 36 and 59 Å, in a direction perpendicular to the fibre axis. These are attributed to lateral dimensions of crystalline regions. The influence of drawing, temperature, and swelling on these interferences is studied. Diagrams are obtained for rolled preparations of the material.

W.R.M.

### Pyrolysis. X—Model Systems for the Pyrolysis of Polyethylene Terephthalate: 2-Hydroxyethyl Benzoate and Related Substances

H. V. R. Iengar and P. D. Ritchie

*J.C.S., 2556-2563 (June 1957)*

2-Hydroxyethyl (or 2-chloroethyl) benzoate breaks down thermally in the vapour phase by three competitive primary reactions: (i) disproportionation to ethylene dibenzoate and ethylene glycol (or 1:2-dichloroethane); (ii) disproportionation to benzoic anhydride and diethylene glycol (or 2:2'-dichlorodiethyl ether); and (iii) alkyl-oxygen scission to benzoic acid and acetaldehyde (or vinyl chloride). These reactions are compared with analogous competitive scissions of 2-phenoxyethanol and 2-phenoxyethyl acetate; the pyrolysis of phenyl vinyl ether is also described. The results assist in interpreting the thermal breakdown of polyethylene terephthalate. H.H.H.

### Polyacrylic Fibre Wolcylon

L. Rudolph

*Textil-Rund., 12, 267-270 (May 1957)*

Physical properties, spinning properties, and potential uses are discussed. S.R.C.

### Acrylic Fibres. XIX and XX—Branched Polyacrylonitrile

A. Hunyar and E. Roth

#### II—Comparison of Normal and Branched Polyacrylonitrile

*Faserforsch. und Textiltech., 8, 143-150 (April 1957)*

The ratio of viscometric and osmotic molecular weights is reduced by branching, but the effect on the Huggins viscometric constant  $k'$  is small. Viscosities of concentrated solutions of branched polyacrylonitriles are less than those of the unbranched polymer of the same intrinsic viscosity. W.R.M.

### III—Spinning and Textile Properties

*Ibid., 8, 179-184 (May 1957)*

Branched polyacrylonitriles are somewhat more soluble than unbranched, and solutions are equally spinnable. Textile properties are not effectively altered by branching and dyeing properties are somewhat better. W.R.M.

#### PATENTS

### Mass-coloration of Rayon with Vat Dyes

American Enka Corp.

*USP 2,738,252*

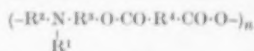
Very even coloration is obtained and there is no clogging of the spinnerets if a purified free leuco compound of a vat dye is dissolved in the alkali spinning solution which is then formed into filaments in the normal way. C.O.C.

### Gas Fading Inhibitors for Inclusion in Spinning Solutions

Celanese Corp., of America

*BP 775,804*

Polyesters containing several ester linkages in the polymer chain and several tertiary amino groups added to spinning solutions of cellulose ester impart good gas fading resistance to dyeings on filaments spun from such solutions. Polyesters of formula—



( $R^1$  = monovalent organic radical;  $R^2$  and  $R^3$  = alkylene of  $> 1$  C;  $R^4$  = satd. or unsatd. hydrocarbon of  $< 9$  C;  $n = > 2$ ), e.g. the product of mol.wt. 2100 obtained by boiling phthalic anhydride with ethyldiethanolamine in xylene, are particularly suitable. C.O.C.

### VII—DESIZING; SCOURING; CARBONISING; BLEACHING

#### Full-width Washing

M. J. Mouton

*Teintex, 22, 253-267 (April 1957)*

Systems using conventional nips, underwater nips, channelled rollers, sprays, movement of liquor with respect to goods, beaters, and ultrasonics are considered. Finally a description of the Vibrotex machine, in which a totally submerged drum made of metallic mesh strengthened by bars, and given an oscillatory motion by an eccentric, is enveloped by the fabric at full width, is given. This drum is claimed to give three-dimensional movement of the goods. S.R.C.

Physical and Chemical Properties of Pigmented Animal Fibres (VI this page)

### VIII—DYEING

#### Dyeing

G. S. J. White

*J.S.D.C., 73, 305-311 (July 1957)*

A subjective assessment of recent advances in dyeing technique covering machinery, research into the mechanism of the dyeing process, and new types of dyes for application to textiles. AUTHOR

#### Physicochemical Aspects of Dyeing

E. Elod

*Teintex, 22, 267-279 (April 1957)*

The free acids of Metanil Yellow (C.I. Acid Yellow 36, C.I. 13065) and Acid Orange A (C.I. Acid Orange 7, C.I. 15510) were chosen as monosulphonates of similar molecular size, one having a hydrophilic and one a hydrophobic character in aqueous solution. On polyamide fibre, mixtures of these dyes showed that Metanil Yellow was taken up almost as much as if it were dyed in a self shade, whilst the uptake of Acid Orange A was reduced to about one-fifth of normal. It is concluded that the dye with hydrophobic character resembling that of the fibre is preferentially absorbed in mixtures. S.R.C.

#### Monolayers. V—Formation of Monolayers by Sulphonated Azo Dyes on Water and Aqueous Solutions

A. Cameron and C. H. Giles

*J.C.S., 3140-3144 (July 1957)*

The monolayer-forming properties, on water and on inorg. acid and salt solns., of water-sol. sulphonated azo dyes are investigated. Cetyltrimethylammonium bromide



(I) or inorg. salts aid in forming condensed monolayers. Complete spreading is obtained with much more dil. soln. of  $\text{BaCl}_2$  than of  $\text{NaCl}$ , and very incompressible films are formed with  $\text{CuCl}_2$  soln. saturated with  $\text{CO}_2$  between pH 4.4 and 6.1. On pure water, even dyes with long alkyl chains spread incompletely. When the dyes are mixed with equiv. quantities of I all of them spread on pure water.

H.H.H.

#### Relation between Physical State and Rate of Fading of Dyes

G. Baxter, C. H. Giles, and W. J. Lewington

J.S.D.C., 73, 386-392 (Aug. 1957)

A theoretical analysis of curves expressing the rate of fading of dyes in different physical forms is given, illustrated by typical examples of the fading of dyes in transparent films, measured spectrophotometrically. Molecularly dispersed dye fades according to an approximate first-order law (exponential decrease of rate), and dye in large particles according to an approximate zero-order law (constant rate). In aggregated particles fading probably occurs only at the surface. The form of the fading-rate curves of most water-soluble dyes, however, suggests that the dyes are present in both forms, i.e. as a heterogeneous mixture of single molecules and aggregated material, the proportion of each varying according to the physical properties of the dye. The heat generated during irradiation causes some of the larger aggregates to break up. This may lead to a slight initial rise in depth of colour or, in special cases, to a fading rate which increases with time. The results explain why the light-fastness grading of dyed fabrics may differ with the extent to which fading has progressed when the assessment is made.

AUTHORS

#### Measurement of Donnan Potentials with Dyed Cellulose and Aqueous Salt Solutions

S. M. Neale and P. K. Saha

J.S.D.C., 73, 381-385 (Aug. 1957)

Measurements have been made of the electrical potential difference (Donnan potential) between dyed Cellophane and aqueous solutions of alkali-metal chlorides. The presence of adsorbed coloured ions of negative electric charge increases the negative potential of cellulose, whereas positively charged coloured ions may reverse the sign of the charge. The measured potentials, whilst smaller than those predicted by the application of the Donnan theory, after making the usual simplifying assumptions, are in good general agreement with modern views of the mechanism of direct dyeing.

AUTHORS

#### Determination of the Migratory Properties of Direct Dyes

José Cogarra

J.S.D.C., 73, 375-381 (Aug. 1957)

The effects have been studied of four variables—temperature, electrolyte concentration, liquor ratio, and agitation—on the migration of direct dyes selected from Classes A, B, and C. At low temperatures increase of temperature has a more favourable influence with Classes A and B than with Class C. An optimum electrolyte concentration for maximum migration is shown by dyes of Classes A and B, but with Class C the migration diminishes steadily as the electrolyte concentration is increased. Increase in liquor ratio increases migration of B and C dyes, but not that of A dyes. Agitation increases migration in all cases.

AUTHOR

#### Interaction of Homologues of Carcinogenic Azo Dyes and Proteins

R. K. Burkhard, R. Bauer, and R. M. Grossman

J. Amer. Chem. Soc., 79, 3209-3212 (20 June 1957)

#### Continuous Dyeing of Secondary Cellulose Acetate, Cellulose Triacetate, and Terylene Polyester Fibre by the Vapocol Process

D. A. Garrett

J.S.D.C., 73, 365-374 (Aug. 1957)

A continuous dyeing technique is described in which fabrics of secondary cellulose acetate, cellulose triacetate, and Terylene are padded with disperse dyes and, after being dried, are subsequently immersed in the saturated vapour of trichloroethylene for times up to 60 sec. to fix the dyes on the fibres. The exhaustion and the fastness properties of dyes fixed by this means on secondary cellulose acetate and cellulose triacetate fibres are at least equal to those obtained by conventional dyeing methods; dyeings on Terylene are limited to pale and medium depths on filament

fabrics. The constriction and the operation of a continuous plant handling 12-in. wide fabrics at speeds up to 10 yd. per min. are described. The process is suitable, without modification, for dyeing blends of these fibres with viscose rayon and cotton, making use of reactive dyes for the cellulosic component.

AUTHOR

PATENTS

#### Azoic Dyeings—Coupling on the Fibre in Presence of Acetic Acid

PH

BP 779,009

Azoic couplings on cellulose involving developing an arylide of an *o*-hydroxycarboxylic acid with the diazo compound of an aminoazo compound containing a nitro group or groups can be accomplished without employing excess of diazo compound, even in longer liquors than 2.5:1, if the diazo soln. contains 5-30 cc. of 50% acetic acid per litre.

E.S.

#### Developing Dyeings or Prints of Vat Dyes

Ciba

BP 774,518

The dyed or printed material is treated with an aqueous solution of < 0.5% by wt. of a sulphonic acid amide, e.g. a mixture of *o*- and *p*-toluene sulphonamides, during or after oxidation of the leuco dye. This gives in a shorter time and/or use of a lower temperature quite as good results as are obtained by the conventional soaping at the boil.

C.O.C.

#### Vat Dyeing and Printing

J. F. Steimlé

BP 775,820

Very fast, level and pure dyeings and prints can be obtained on cellulose with vat dyes by replacing the usual water-soluble reducing agent by a powdered metal which develops hydrogen in conc. aq. hydroxide. Thus cotton cloth is padded with a solution made up of C.I. Vat Green 2 (7.5 parts), an oleyl-polyglycol ether containing 20 ethylene oxide groups (1.5), zinc dust (1.5), water (79.5) and Thickeners BL (10.0), then treated for 2 min. in 18° B $\phi$  NaOH at 70°C., wet steamed for 4 min., soaped and dried. Thickeners BL is made by soaking British Gum (200) for 12-24 hr. in water (400) and then mixing with sodium alginate (10) which has been soaked in water (200) for 24 hr.

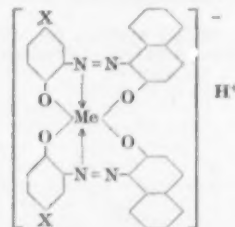
C.O.C.

#### Colouring Acetate Rayon with Anionic Metal-complex Dyes

T. E. Marchington &amp; Co.

BP 774,537

Acetate rayon can be coloured with dyes of formula—



(Me = trivalent metal; X =  $\text{SO}_3\text{NH}_2\text{SO}_2\text{NHCH}_3$  or  $\text{SO}_3\text{CH}_3$ ) if there is a water-soluble liquid organic swelling agent for cellulose acetate present in the dyebath or such an agent or a water-soluble inorganic salt which is a swelling agent for cellulose acetate present in the printing paste. Thus C.I. Acid Yellow 116 (2 g.) is boiled in water (150 cc.), cold water (200 cc.) added and ethyl alcohol (650 cc.). An acetate warp, cotton weft fabric is treated in this liquor for 10 min. at 30°C. and is then washed in cold water, again in water at 50-60°C. and finally soaped at 60-70°C. This dyes the warp bright yellow and leaves the weft unstained.

C.O.C.

#### Colouring Cellulose Acetate Fibres of High Acetyl Value

Celanese Corp., of America

BP 775,406

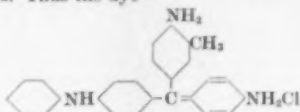
A solid colouring material, e.g. a vat dye, is deposited on the surface of the fibres which are then heated long enough and at a high enough temperature to cause the colouring matter to penetrate the fibres. Thus a cloth of cellulose acetate containing 0.20 alcoholic hydroxyl group per anhydroglucose unit is padded with its own weight of an aqueous dispersion of C.I. Vat Blue 6 (40 g. per litre) and sodium lignosulphonate (20) at 30°C., dried, baked for



30 sec. at 230°C., scoured in 0.3% soap solution for 30 min. at 80°C. This yields a full blue dyeing of good fastness to washing at 160°F. C.O.C.

#### Dyeing and Printing Polyacrylonitrile Fibres

Ciba BP 775,766  
Triphenylmethane dyes containing no sulphonic acid group and having as substituted amino groups, such a substituent being present in at least one of the phenyl nuclei in *para* position to the central C atom, have good affinity for polyacrylonitrile fibres. Thus the dye—



yields a strong violet from a boiling acid bath. C.O.C.

#### Dyeing or Printing Polyacrylonitrile Fibres

BASF BP 774,320  
Before being dyed or printed the material is treated in an acid bath containing cuprous ions but no free reducing agent. This results in better dyeings and prints and reduces the tendency of the material to collect static and become dirty. Thus cuprous chloride (10 g.) is mixed with water (150) and enough conc. HCl to ensure complete dissolution at 90°C. The liquor is then made up to 3 litres with water, brought to 90–100°C. and polyacrylonitrile yarn (200 g.) treated in it for 15–30 min. The yarn is then squeezed, rinsed and dyed with 3% of C.I. Acid Yellow 9 for 1 hr. at 95°C. using a liquor ratio of 30:1. This yields a deep yellow dyeing which does not readily become dirty. C.O.C.

Acrylic Fibres. XIX and XX—Branched Polyacrylonitrile (VI p. 481)

Mass-coloration of Rayon with Vat Dyes (VI p. 481)  
Pigment Printing and Pigment Padding (IX below)

## IX—PRINTING

### PATENTS

#### Tensioning the Gauze in Screen Printing Frames

R. A. Knowles BP 774,131

#### Pigment Printing and Pigment Padding

FBY BP 774,101  
A process in which polymers, condensates or addition products which are water-soluble at least as their salts, or soluble in organic solvents and which contain both aliphatic amino groups and groups capable of reacting with such groups to give cross linking are heated on textiles at 80–200°C. Thus a basic polyurea of viscosity number  $\eta = 138$  (prepared from 0.2 mol. diethylene triamine, 0.8 mol. *vv'*-diaminodipropylmethanamine and 1.0 mol. hexamethylenediacrylate) is made into a 10% solution in acetic acid. To this solution (400 parts) is added a 15% paste of copper phthalocyanine (150) and water (500). This paste is printed onto cotton or spun rayon fabric and heated for 5 min. at 100°C. to yield prints of excellent fastness to light and washing. C.O.C.

#### Triarylmethane Colouring Compositions for Typewriter Ribbons, etc.

DuP BP 770,574  
Typewriter ribbons, "carbon" copying papers and master sheets for hectograph copying are normally coloured by triarylmethane dyes, e.g. C.I. Basic Violet 1 and 3 etc., in oily or waxy media. These colours have serious disadvantages in the form in which they are used, e.g. their powders give rise to noxious, staining dusts during the manufacturing stages and the final manufactured articles containing them also stain the human skin. The azo colouring matters used in admixture with the triarylmethanes when colours other than violets are desired do not suffer from these defects and are referred to as "non-smudging" colours. The present invention seeks to solve the smudging and dusting problems by applying the triarylmethane dyes as their colourless *leuco*-compounds. As these *leuco*-compounds are unstable, they are stabilised to atmospheric oxygen by associating them with certain organic bases. The colourless, spirit-soluble *leuco*-compounds stabilised with the appropriate organic base are applied to the normal manufactured article in the

usual manner. The organic bases used as stabilisers are quaternary ammonium hydroxides, e.g. choline  $\text{HOC}_2\text{H}_4\text{N}(\text{OH})(\text{CH}_3)_3$ , and are present in sufficient quantity to give pH < 8 in a 1% solution of the colouring matter in ethanol. In order to produce copies, the colourless *leuco*-compound must be re-oxidised, e.g. by chloranil which may be applied to the copying paper before or after the duplicating process. Examples 1–22 describe the preparation of stabilised *leuco*-compounds whilst Examples 23–28 describe formulations and the application of the final products. E.T.

#### Monopack Paper and Film for Colour Photography

Photo-Chemical Co. BP 779,608  
If the colour coupler dispersion is separately made and its pH and the electrolyte concentrations adjusted to the same as those of the silver halide emulsion then on them being mixed the coupler is inert to the silver halide. C.O.C.

#### Mordanting of Imbibition Film Blanks

Technicolor Motion Picture Corp. BP 779,621  
Insoluble dibiguanide copper, nickel and cobalt chelates act as mordants for acid and direct dyes on films coated with a colloid. Thus the colloid layer of an imbibition blank film is treated in 1–6% aqueous dibiguanide acid salt and then with a dil. aq. soln. of a copper, nickel or cobalt salt. A dye image is then transferred to the mordanted film. This results in very sharp images. C.O.C.

#### Magenta Dye Images in Silver-Dye-Bleach Colour Photography (IV p. 477)

Developing Dyeings or Prints of Vat Dyes (VIII p. 482)

Vat Dyeing and Printing (VIII p. 482)

Colouring Acetate Rayon with Anionic Metal-complex Dyes (VIII p. 482)

Dyeing and Printing Polyacrylonitrile Fibres (VIII this page)

Dyeing or Printing Polyacrylonitrile Fibres (VIII this page)

## X—SIZING AND FINISHING

#### Influence of Textile Auxiliaries on the Absorption of Dirt by Perlon Materials—I

A. Wiekeln

*Faserforsch. und Textiltech.*, 8, 230–239 (June 1957)  
The possibility of rendering Perlon textiles dirt-repellent is discussed. Soiling tests are used to examine the effects of a large number of different antistatic agents and finishing materials. Some dirt-repelling effects are reported, and possible modes of hindering soiling considered. W.R.M.

#### Properties of Partially Cyanoethylated Linen Cloth

M. Zilahi and E. Mócsnár  
*Faserforsch. und Textiltech.*, 8, 192–194 (May 1957)  
Methods of cyanoethylation of cotton are reviewed and resulting modifications in properties described. A method for cyanoethylation of flax and hemp is described. Results of studies on changes in retting, breaking and abrasion resistances, and water permeability and swelling are given. W.R.M.

#### Protection of Textiles against Moths, Insects, and Termites

J. Salquain

*Teintex*, 22, 279–291 (April), 374–387 (May), 443–455 (June), 522–539 (July 1957)  
A lengthy review covering the insects, inhalation and stomach poisons, contact insecticides, and fibre-modifying methods. S.R.C.

### PATENTS

#### Dimensionally Stable Regenerated Cellulose Textiles

American Viscose Corp. BP 775,913  
The materials are treated with an aqueous dispersion of a water-soluble cellulose ether,  $\text{HCHO}$  and a self-emulsifiable, wax-like plasticiser, the dispersion having pH 1.2–1.8. An alkali metal bisulphate is preferably used both to adjust the pH and as the catalyst. After this treatment the materials are dried and baked under tension at the requisite dimensions. C.O.C.

#### Imparting Flame-resistance to Cellulosic Materials

Dow Chemical Co. BP 774,263  
The material is impregnated with a 5–40% solution in a volatile solvent of a bis-( $\alpha$ -monohaloalkenyl)- $\alpha$ -monohaloalkene phosphonate in which the alkyl and alkane

groups are alike and of 2-3 C and in which the halogen atoms are Cl or Br, e.g. bis(2-bromoethyl)-2-bromoethane phosphonate or the corresponding chlorine compound.

C.O.C.

### Increasing the Mechanical Strength of Cyanoethylated Cotton

Institute of Textile Technology

BP 775,118

The cyanoethylated cotton is treated with a solution of a water-soluble amine, e.g. an aqueous solution of ethylenediamine or diethylenetriamine. This increases the tensile strength, elongation and abrasion resistance.

C.O.C.

### Reducing the Tendency of Wool to Felt

Wolsey

BP 774,531

The wool is treated in an aqueous solution of an *N*-chloro compound of urea or of sulphamic acid or of melamine which does not hydrolyse to chloramine at pH < 4 and 0.05-2.5 g. of a water-soluble bromide per litre.

C.O.C.

### Permanent Pleating of Fabrics containing Keratin Fibres

Marks &amp; Spencer

BP 775,486

The material is mechanically pleated and then while the pleats are still under mechanical control steamed in presence of a volatile reducing agent for the disulphide bonds of the keratin molecule followed by further steaming in presence of the volatile agent so as to ensure that damage to the fibre is minimised after the disulphide bonds have been broken. Thus fabric is dusted with a volatile base, e.g. hydrazine hydrate or ammonium bisulphite, pleated and steamed in the usual manner. This gives pleats which withstand both dry cleaning and washing with aqueous soap solution.

C.O.C.

### Embossing Cloth or Plastic Films

BrC

BP 774,096-7

The cloth or film passes around a substantial portion of the circumference of an embossing roller. At a position shortly after it touches the roller and extending for only a short distance it is pressed while hot between the roller and a belt of resilient material. During the remainder of its passage in contact with the roller the embossed effect is set e.g. by cooling. The belt of resilient material passes around the roller with the cloth or film. The pressure is applied by a yieldably mounted pressure member bearing directly onto the belt.

C.O.C.

### Flame Resisting Finish

Francolor

BP 774,694

Materials treated with an aqueous solution of the products obtained by treating phosphonitrile chloride with ammonia are given a flame resisting finish which is fast to water, weathering and washing.

C.O.C.

### Metallised Effects on Textiles

Hoherlein &amp; Co.

BP 774,223

Cloth having clearly visible interstices between the yarns which interstices form < 25% of its area, are treated with metal vapour. This results in the metal deposited on the side of the cloth being invisible when that side is viewed perpendicularly from the other side of the cloth but visible locally, giving an iridescent appearance when viewed obliquely. Thus violet acetate voile is coated on one side in a high-vacuum chamber with silver and then gold. When the other side of the fabric is viewed obliquely, the metallised side becomes locally visible as a golden sheen.

BP 774,439

The adhesion of the metal to cellulosic cloths is increased if before being coated they are treated so as to reduce their swelling in water, e.g. by treatment with formaldehyde and an acid catalyst at 100-200°C. The adhesion can be still further enhanced by coating the material whose swellability in water has been reduced with a thin layer of a water-insoluble natural or synthetic resin.

C.O.C.

## XI—PAPER AND OTHER CELLULOSIC PRODUCTS

### PATENTS

#### Paper of Improved Strength from Cotton Linters

Hercules Powder Co.

BP 778,797

The strength of paper made from cotton linters may be increased by chemically modifying the cellulose with the introduction of hydrophilic or polar substituents to the

anhydroglucose units, e.g. hydroxyethyl cellulose, sodium carboxymethyl cellulose and carboxymethyl cellulose. The degree of substitution may be < 0.2 or 0.2-0.3, depending on the necessity for a cellulose derivative which is both alkali- and water-insoluble or only water-insoluble.

G.S.B.

#### Paper of Increased Whiteness and Improved Mechanical Properties

H. M. Freud

BP 780,513

Treatment of paper pulps may be improved by the addition into the hollander or tub of suspensions at pH 5.5-7.0 comprising a zirconium salt, an alkali citrate and gelatine or like albuminoid gum.  $TiO_2$  or  $CeO_2$  may replace  $ZrO_2$  and other hydroxy acids such as malic, tartaric or lactic may replace the preferred citric acid. This treatment results in a paper of enhanced whiteness, opacity, burst strength and resistance to fungi and microbes.

G.S.B.

#### Stiffening Paper, etc.

Structural Paper Co.

BP 779,619

Fibrous material such as paper and board is stiffened by impregnation with aq. ammonium or potassium alum. The specific gravity of the ammonium alum soln. is preferably 1.452-1.485 and that of the potassium alum soln. 1.440-1.535, the former being at 104-109°C. and the latter at 102-104°C. The weight of the impregnant to weight of unimpregnated paper is < 50%. Enhanced surface smoothness is achieved by addition of finely divided inert filler, e.g. Kaolin, to the alum soln.

G.S.B.

#### Loading Agent or Filler for Paper

S. D. Warren Co.

BP 778,791

Improved filler retention is obtained without the use of alum by incorporating the fillers into paper with an organic colloid material such as a manno-galactan or a glucmannan, the particles of the filler being wholly or partly coated with colloid material before or simultaneously with their deposition upon the paper fibres. An example of the amount of manno-galactan added is 0.5% of the air-dry weight of finely divided mineral filler.

G.S.B.

#### Coating Paper

H. G. C. Fairweather

BP 778,955

The surface smoothness of coating applied to paper by a rubber covered applicator roll is improved by use of a slowly rotating doctor rod supported in a holder which grasps the rod around more than half of its circumference. The doctor rod is pressed against the surface of the applicator with adjustable pressure, and may be rotated in a direction opposed to that of the applicator.

G.S.B.

#### Cast Coated Paper

S. D. Warren Co.

BP 780,405

A printing paper with enhanced gloss and freedom from dull spots is obtained by incorporation into the 'cast' coating of mineral pigment and hydrophilic proteinaceous adhesive of a release agent such as a dimer of a higher aliphatic ketene having a carbon chain of from 6 to 20 carbon atoms. The ratio of dimer to pigment coating in parts by weight is 0.5 to 100 or 3.0 to 100 for a coating with greater water-repellency.

G.S.B.

#### Pressure Rupturable Record Material

National Cash Register Company

BP 773,180

A method of deactivating portions of a manifold copy sheet of record material sensitised with particles of an adsorbent colour-reactant substance is described. The desensitising compound comprises a highly polar, non-volatile, non-colour-forming absorbate substance such as cationic quaternary ammonium salt, aliphatic or aryl amine acetate, dodecyl amine, dodecyl diamine, or oxazoline.

Embossing Cloth or Plastic Films (X this page)

## XIII—RUBBER; RESINS; PLASTICS

Embossing Cloth or Plastic Films (X this page)

## XIV—ANALYSIS; TESTING; APPARATUS

Surface Structure of Wool Fibres (VI p. 480)

Fine Histology of Wool (VI p. 480)

Relation between Physical State and Rate of Fading of Dyes (VIII p. 482)

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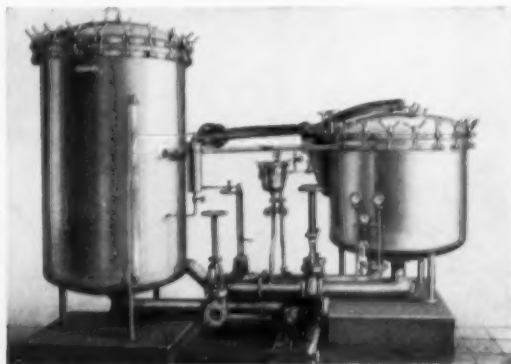
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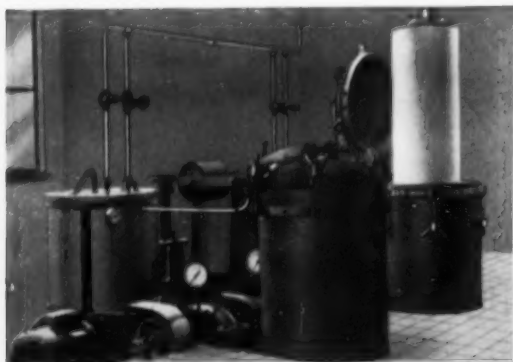
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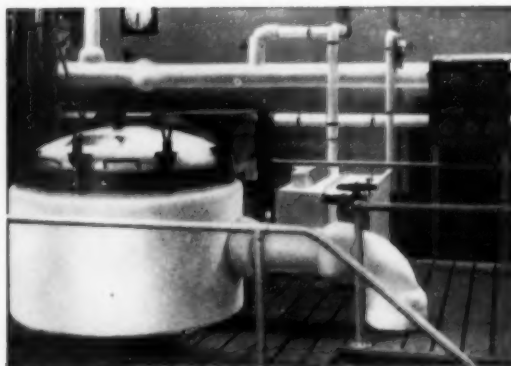
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## FORTHCOMING MEETINGS OF THE SOCIETY—continued from page xii

**Wednesday, 22nd January 1958**

MIDLANDS SECTION. *Colloquium . . . Auxiliary products—Use and Abuse.* (Short papers by local members.) College of Technology, **Leicester**. 7 p.m.

SCOTTISH JUNIOR BRANCH. *Practical Aspects of Fastness Testing To-day.* P. R. Dawson, Esq. (Imperial Chemical Industries Ltd.). Technical College, **Paisley**. 7.30 p.m.

**Friday, 24th January 1958**

WEST RIDING SECTION. Ladies' Evening. Victoria Hotel, **Bradford**. 7.30 p.m.

**Monday, 27th January 1958**

BRADFORD JUNIOR BRANCH. *Spun-dyed Fibres, their Properties and Uses.* C. C. Wilcock, Esq., A.R.T.C., F.T.I., F.S.D.C. (Courtaulds Ltd.). Bradford Institute of Technology, **Bradford**. 7.15 p.m.

**Thursday, 30th January 1958**

WEST RIDING SECTION. *A New Approach to Pigment Dyeing of Piece Goods.* Dr. Sulzer (Ciba Ltd., Basle). Victoria Hotel, **Bradford**. 7.30 p.m.

**Saturday, 1st February 1958**

MANCHESTER SECTION. Annual Dinner and Dance. The Grand Hotel, **Manchester**.

**Monday, 3rd February 1958**

HUDDERSFIELD SECTION. *Shrink Resistance of Wool.* A. N. Davidson, Esq., B.Sc. (Wool Industries Research Association). (Joint Lecture with the Huddersfield Textile Society.) Technical College, **Huddersfield**. 7.30 p.m.

**Tuesday, 4th February 1958**

LONDON SECTION. *Progress in Textile. A review of developments and their effect on industry and user—Dyeing and Finishing.* T. Vickerstaff, Esq., M.Sc., Ph.D., F.S.D.C. (Joint Meeting with the London Section, Textile Institute.) Chemical Society, Burlington House, **London, W.1.** 6.30 p.m.

**Friday, 7th February 1958**

LONDON SECTION. *Spun-dyed Fibres, their Properties and Uses.* C. C. Wilcock, Esq., A.R.T.C.S., F.T.I., F.S.D.C. (Courtaulds Ltd.). Royal Society, Burlington House, **London, W.1.** 6 p.m.

**Tuesday, 11th February 1958**

BRADFORD JUNIOR BRANCH. *The Role of Optical Whitening Agents.* C. Fearnley, Esq., B.Sc., Ph.D. (Geigy Co. Ltd.). Bradford Institute of Technology, **Bradford**. 7.15 p.m.

NORTHERN IRELAND SECTION. *A New Approach to Pigment Dyeing.* Dr. G. Sulzer (Ciba Limited). Further details later.

**Thursday, 13th February 1958**

MANCHESTER JUNIOR BRANCH. *The Scientific Background to Mangle.* E. Moss, Esq. Room C9, Manchester College of Technology, **Manchester**. 4.30 p.m.

MIDLANDS SECTION. *A New Approach to the Pigment Dyeing of Piece Goods.* Dr. G. Sulzer (Ciba Ltd, Basle). Gas Board Theatre, **Nottingham**. 7 p.m.

WEST RIDING SECTION. *Investigations on the Dyeing Process of Polyester Fibres with Disperse Dyes.* Dr. Glenz (Bayer Co., Leverkusen). Metropole Hotel, King Street, **Leeds**. 7.30 p.m.

**Tuesday, 18th February 1958**

HUDDERSFIELD SECTION. *The Continuous Dyeing of Wool.* D. R. Lemin, Esq., B.Sc. (Imperial Chemical Industries Ltd.). Silvios Cafe, Westgate, **Huddersfield**. 7.30 p.m.

SCOTTISH SECTION. *A New Approach to Pigment Dyeing of Piece Goods.* Dr. G. Sulzer (Ciba Ltd., Basle). St. Enoch Hotel, **Glasgow**. 7.15 p.m.

**Thursday, 20th February 1958**

BRADFORD JUNIOR BRANCH. Annual Dance. Fountains Hall, **Bradford**.

**Friday, 21st February 1958**

MANCHESTER SECTION. *The Application of Acrylonitrile in the Textile Industry.* J. H. MacGregor, Esq., Ph.D., F.R.I.C. (Courtaulds Ltd., Textile Research Laboratory, Bocking). The Textile Institute, 10 Blackfriars Street, **Manchester 3**. 7 p.m.

**Friday, 28th February 1958**

WEST RIDING SECTION. J. B. Speakman, Esq., D.Sc., F.R.I.C., F.T.I. Details later.

**Friday, 7th March 1958**

BRADFORD JUNIOR BRANCH. *The Dyeing of Cellulosic Fibres with Alcan X Dyestuffs.* J. T. Turner, Esq. (I.C.I. Ltd.). Bradford Institute of Technology, **Bradford**. 7.15 p.m.

LONDON SECTION. *Recent Developments in the Dyeing of Man-made Fibres.* Dr. R. Wittwer (Ciba Ltd.). Royal Society, Burlington House, **London, W.1.** 6 p.m.

**Tuesday, 11th March 1958**

HUDDERSFIELD SECTION. *Recent Developments in the Dyeing of Man-made Fibres.* Dr. R. Wittwer (Ciba Limited, Switzerland). Silvios Cafe, Westgate, **Huddersfield**. 7.30 p.m.

NORTHERN IRELAND SECTION. *Some Observations in the Uses of Synthetic Resin Products and Chemical Reactants to Cellulosic Materials.* F. Sloan, Esq., M.Sc. (Kirkpatrick Bros. Ltd.). Further details later.

**Thursday, 13th March 1958**

MANCHESTER JUNIOR BRANCH. *Terylene.* J. R. Whinfield, Esq. Room C9, Manchester College of Technology, **Manchester**. 4.30 p.m.

WEST RIDING SECTION. Discussion, *Fluorescent Brightening Agents.*

{ A Member of the British Cotton Industries Research Association.

Panel { J. S. Ingham, Esq. (Marks & Spencer Ltd.).

{ Dr. Fearnley (Geigy Co. Ltd., Manchester).

{ J. Rayment, Esq. (G. & W. N. Hicking).

Victoria Hotel, **Bradford**. 7.30 p.m.

**Tuesday, 18th March 1958**

SCOTTISH SECTION. *Easy-care Finishes on Fabrics Containing Courpeta, with Special Reference to Pleating, Embossing and Setting.* A. S. Cluley, Esq., F.T.I. and S. N. Bradshaw, Esq. (Courtaulds Ltd., Coventry). St. Enoch Hotel, **Glasgow**. 7.15 p.m.

**Wednesday, 19th March 1958**

MIDLANDS SECTION. *Optical Brightening Agents.* D. A. W. Adams, Esq., B.Sc., Ph.D. (Joint meeting with The British Association of Chemists.) Midland Hotel, **Derby**. 7 p.m.

**Friday, 21st March 1958**

MANCHESTER SECTION. One-day Symposium. *New Information on Finishing Processes.* Manchester College of Science and Technology, **Manchester**.

MIDLANDS SECTION. Section Annual Dinner. George Hotel, **Nottingham**.

**Tuesday, 25th March 1958**

HUDDERSFIELD SECTION. Annual General Meeting.

**Thursday, 27th March 1958**

BRADFORD JUNIOR BRANCH. *Continuous Dyeing of Wool.* D. R. Lemin, Esq., B.Sc. (I.C.I. Ltd.). Bradford Institute of Technology, **Bradford**. 7.15 p.m.

WEST RIDING SECTION. Annual General Meeting. Victoria Hotel, **Bradford**. 7.30 p.m.

**Saturday, 29th March 1958**

BRADFORD JUNIOR BRANCH. Annual General Meeting. Bradford Institute of Technology, **Bradford**. 10.15 a.m.

**Thursday, 3rd April 1958**

MIDLANDS SECTION. *Recent Trends in Dyeing for the Carpet and Hosiery Trades.* W. Beal, Esq., B.Sc. (Geigy Co. Ltd.). Messrs. Carpet Trades Ltd. Canteen, Mill Street, **Kidderminster**. 7.30 p.m. (Joint with the Textile Institute, Kidderminster Section).

**Wednesday, 16th April 1958**

MIDLANDS SECTION. *Basic Principles of Dyeing with Disperse Dyes.* D. Finlayson, Esq., M.C., M.A., D.Sc. and H. C. Olpin, Esq., M.Sc., F.R.I.C., F.S.D.C. King's Head Hotel, **Loughborough**. 7 p.m. (Preceded at 6.30 p.m. by the Annual General Meeting of the Section.)

**Friday, 18th April 1958**

LONDON SECTION. *Colour Fastness Requirements of Luton Textiles.* I. Glasman, Esq., A.T.I. (Marks & Spencer Ltd.). George Hotel, **Luton**. 7 p.m.

MANCHESTER SECTION. Annual General Meeting. Details to be announced later.






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All inquiries relating to Advertisements should be addressed to THE GENERAL SECRETARY, THE SOCIETY OF DYERS AND COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE.

Replies may be addressed Box —, THE SOCIETY OF DYERS AND COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE, where all communications relating to these Advertisements are treated in strict confidence.

### APPOINTMENTS VACANT

**A** RAPIDLY EXPANDING chemical company wish to appoint at its works in North-East England a Colourist to take charge of a new laboratory for the production of coloured finishes for leather. This is a new appointment and applications are invited from men over 30 years of age with at least 5 years' experience in colour matching in the textile, leather or paint fields. Assistance with housing. Pension and Life Assurance Schemes. Write stating age, qualifications, experience and present salary in confidence to Box V137.

**DYER** required by Laundry and Dry Cleaning Group with well established dyeing business, also trade dyeing. This department is capable of considerable expansion and the Company is prepared to carry this out if a suitable type of Dyer can be found, who must have first-class knowledge of all aspects of the dyeing trade and especially of new fabrics. Help will be given in finding permanent accommodation and good temporary accommodation can be offered immediately. Excellent salary and prospects for first-class man.

Box V131

**TECHNICAL SERVICE AND PRODUCT DEVELOPMENT**—Chemical Manufacturers near Manchester require Textile Chemist to set up technical service department for textile auxiliaries. Applicants should have University degree or equivalent, with good practical experience in the dyeing and finishing of cellulosic and synthetic fibres. Age 30-40. The position involves laboratory investigations and also visits to customers, and a car will be provided. Salary will be in accordance with qualifications and a Pension Scheme is operated. Box V136

### AGENT REQUIRED

**SCHOLL A.G.**, manufacturers of Dyeing Plant and Equipment seek an agent in the British Isles. Inquiries are invited from firms having a sales and publicity organisation able to undertake the work of an agency for a wide range of high quality plant and equipment. Scholl A.G., Zolingen, Switzerland.

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- |  |  |
|--|--|
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| Adams, Wm. J., formerly of Beechgrove, Lambeg, Lisburn, N. Ireland               | Le Bek, I. A. G., formerly of 8 Lad-Hill Lane, Greenfield, near Oldham, Lancashire                   |
| Apsis, A., formerly of 20 St. Paul's Road, Manningham, Bradford                  | Maschas, L., formerly of 43 St. John's Road, Huddersfield  |
| Balmforth, B., formerly of Flat 3, Quarmby Lodge, Huddersfield, Yorkshire        | Midgley, F. B., formerly of "Clova", 57 Jeremy Lane, Heckmondwike, Yorkshire                         |
| Bloor, J. E., formerly of 40 Athol Road, Whalley Range, Manchester 16            | Minto, P., formerly of 520 Hatley Street, Magog, P. Quebec, Canada                                   |
| Bromby, N. G., formerly of 170 Palatine Road, West Didsbury, Manchester          | Musselwhite, A. G., formerly of 6 Margery Terrace, Gummerdale, Carlisle                              |
| Brooke, F. W., formerly of 51 Victoria Drive, Horsforth, Leeds                   | Papadimitrov, D. K., formerly of 20 St. Paul's Road, Manningham, Bradford                            |
| Cameron, M. C., formerly of 11 Thirlmere Gardens, Belfast, N. Ireland            | Parsons, R., formerly of "Chetwyn", Hylion Road, Leicester   |
| Ciprut, J. V., formerly of Technical College, Dyeing Dept., Bradford, Yorks.     | Ramadan, A. S., formerly c/o Beida Dyers, Dyeing Department, Alexandria, Egypt                       |
| Desmond, J. J., formerly of 1416 Molcomb Road, Huntington Valley, Pa., U.S.A.    | Rahman, S. M. K., formerly of Lock View Hall, 1025 Gt. Western Road, Glasgow                         |
| Gale, R. A., formerly of 32 Wordsworth Street, Hapton, near Burnley, Lancs.      | Slater, W. K., formerly of 85 Hope Road, Sale, Cheshire  |
| Harvey, H. C., formerly of 77 Edinburgh Road, Congleton, Cheshire                | Smith, L., formerly of 80 Fair View Road, Bacup, Lancashire  |
| Heaton, Donald, formerly of 23 Bangor Road, Cheadle, Cheshire                    | Subramaniam, C. R., formerly Dyeing Master, The Azam Jahi Mills Ltd., Warangal, Hyderabad, India     |
| Heaton, R., formerly of 142 Browning Road, Manor Park, London E.12               | Stamires, D., formerly of 9 Shaw Lane, Leeds 6   |
| Jackson, J. B., formerly of 36 Arden Road, Crumpsall, Manchester 8               | Tsien, P. C., formerly of 1332 Tenan Road, Shanghai, China   |
| Kabil, R., formerly of Softex and Company, Mataria Street, Zeitoun, Cairo, Egypt | Wahba, F. S., formerly c/o Beida Dyers S.A.E., P.O. Bag., Alexandria, Egypt                          |
| Kothawala, Amin A., formerly of 36 Briarwood Drive, Wibsey, Bradford 6           | Wailos, N. T., formerly of "Hamewith", 4 Kingsway Terrace, Dundee, Scotland                          |
|  | Waldie, W. J., formerly of H. H. Buckley & Co. Pty. Ltd., 34 Queens Road, Melbourne S.C.2, Australia |
|  | Wignall, J. H., formerly of 4 Rosebank, Douglas Road, Cork, Eire                                     |
|  | Zwicky, A. M., formerly of 23 West Lought Street, Crumpsall, Manchester 9                            |

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- Ainscough, J. R., *formerly of 248 Crown Lane, Horwich, near Bolton, Lancs., to 1 Devon Place, Scotforth, Lancaster*
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- Baird, P., *formerly of 143 Gallowa Hill Road, Paisley, Renfrewshire, to 119 Gordon Road, West Bridgford, Notts.*
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- Beal, W., *formerly of 1 Westfield Lane, Wrose, Shipley, to The Geigy Co. Ltd., 4 Vincent Street, Bradford 1*
- Butcher, Dr. J. V., *formerly of 13 Crawford Avenue, Bolton, Lancashire, to "Amber House", Bolton Road, Heath Charnock, Chorley*
- Chingros, C., *formerly of Box 516, Lowell Tech. Institute, Lowell, Mass., to White Street, Lunenburg District, Fitchburg, Mass., U.S.A.*
- Clayton, J., *formerly of 26 Pratt Lane, Windhill, Shipley, to 16 Prospect Avenue, Windhill, Shipley*
- Datynier, Dr. A., *formerly of Leicester College of Technology and Commerce, School of Chemistry, Leicester, to School of Textile Technology, N.S.W. University of Technology, P.O. Box 1, Kensington, Sydney, Australia*
- Downey, D. A., *formerly of I.C.I. Ltd., Dyehouse Dept. (Dyestuffs Division), Hexagon House, Blackley, Manchester 9, to I.C.I. Dyestuffs Division, Standardising Dept., Grangemouth Works, Grangemouth, Stirlingshire*
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- Haw, J. A., *formerly of 70 Thornton Lodge Road, Huddersfield, to c/o L. B. Holliday & Co. Ltd., 19 Waterloo Street, Glasgow C.2*
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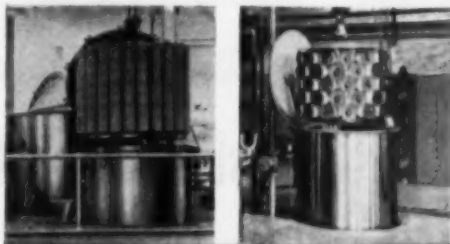
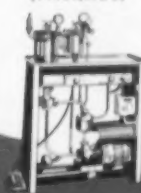
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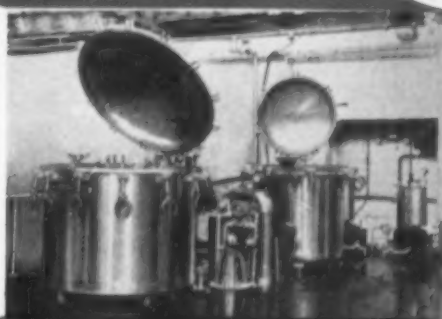
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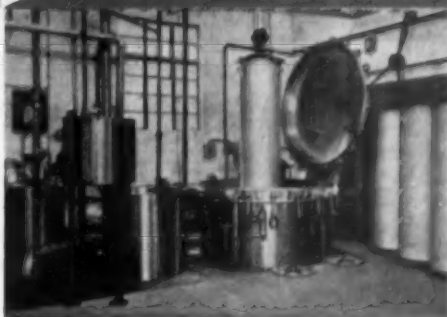
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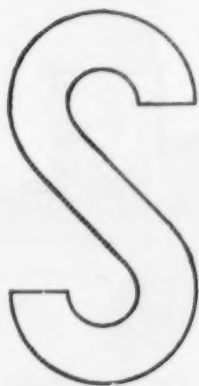
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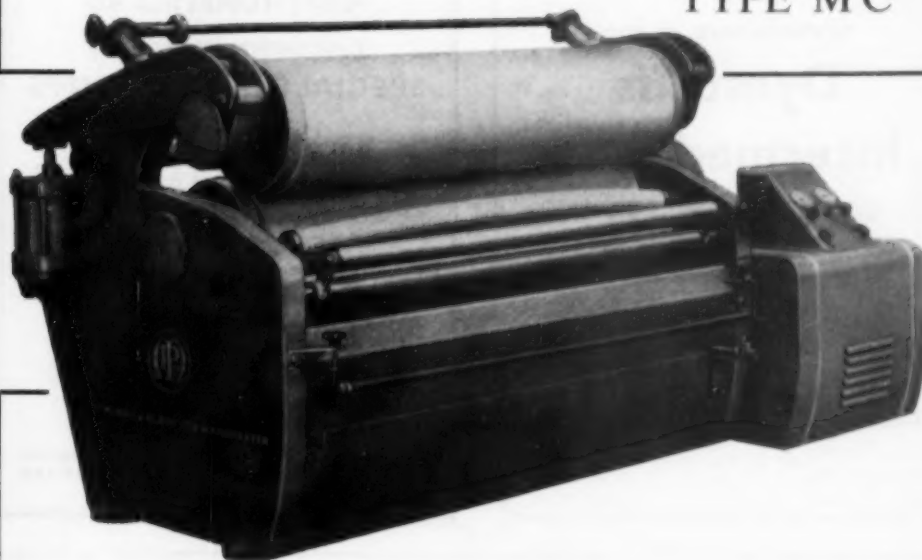
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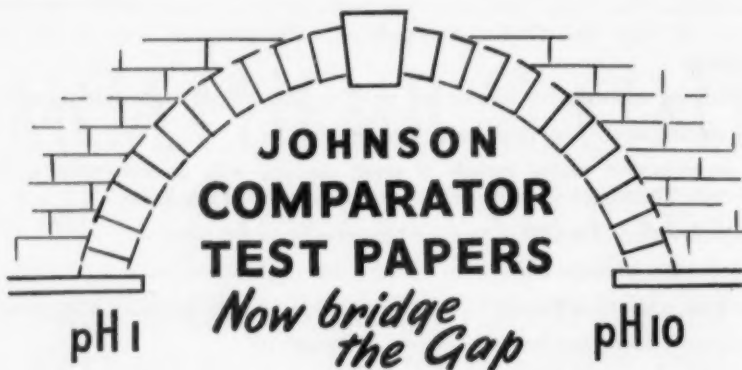
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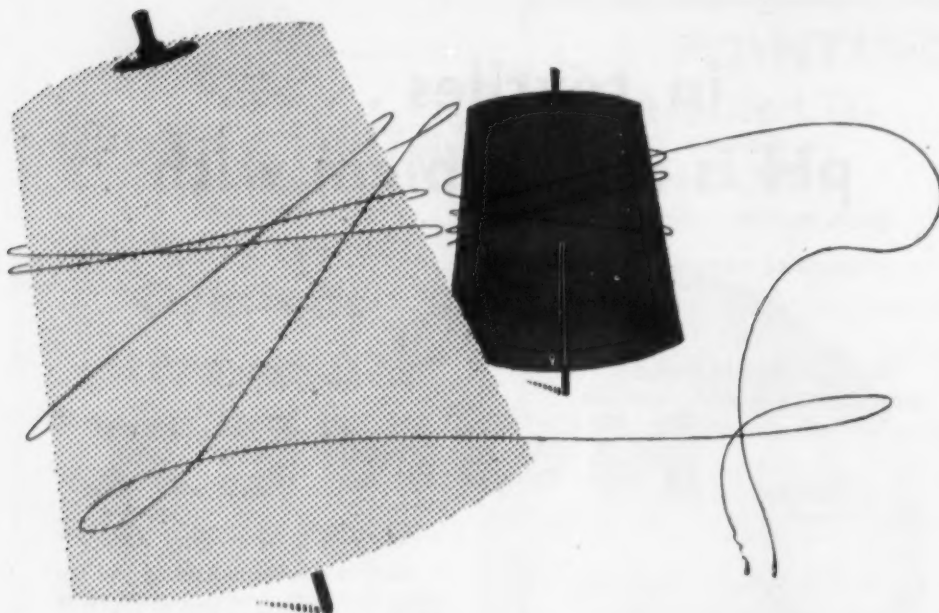
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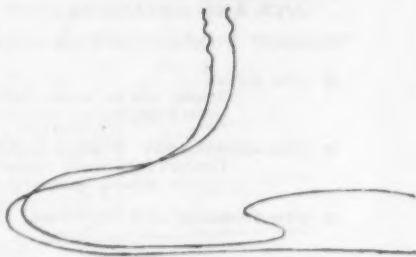
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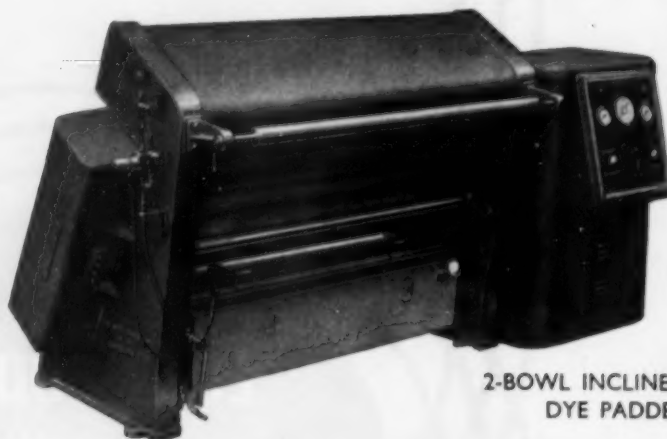
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